PUBLIC HEALTH REPORTS

Volume 73, Number 9

SEPTEMBER 1958

Published since 1878

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Public Health Reports, published since 1878 under authority of an act of Congress of April 29 of that year, is issued monthly by the Public Health Service pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220. Use of funds for printing this publication approved by the Director of the Bureau of the Budget, August 24, 1957.

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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the Hospital as a Community Health Center

EDWIN L. CROSBY, M.D., Dr.P.H.

Following is the Wilinsky Lecture, delivered at the Harvard School of Public Health, Boston, on October 14, 1957. The Charles F. Wilinsky Lecture Fund was established in 1954 to endow lectures on the role of the hospital in public health. Dr. Wilinsky served as executive director of Beth Israel Hospital in Boston and deputy health commissioner of that city. He is a former president of both the American Public Health Association and the American Hospital Association.

THE HOSPITAL is a dynamic, not a static, institution. Looking at our hospitals in the context of American life and medical and scientific progress, we know that a revolution in hospital care is under way. In the words of Dr. James Mackintosh, emeritus professor of public health, School of Tropical Hygiene and Public Health, University of London, "It is exciting to live in a revolution; it is tragic not to realize it."

A little more than a half century ago it seemed that we'd gone about as far as we could. Then science exploded into medicine and almost overnight there was a whole galaxy of new treatment techniques, new equipment, and new and different personnel. Even professional workers in the health field must be astounded by the many new scientific developments which have changed hospital and health care in the last two generations. This period has been marked by the development of roentgenology; advances in the science of nutrition, including the discovery of vitamins; elimination of most of the infectious diseases through immunization, better control, and good public health practice; the control of diabetes with insulin; the discovery of the antibiotics; the medical use of radionuclides; new anesthetics making possible amazing surgical procedures; the use of human blood and its fractions; and so many other giant feats that I cannot possibly mention them all. During this period, medical thought broadened to see the individual as a physical and emotional whole. As Francis Peabody said, "What is spoken of as a clinical picture is not just a photograph of a man in bed; it is an impressionistic painting of the patient surrounded by his home, his work, his relations, his joys, sorrows, hopes and fears"(*1*).

In addition to the effect of new techniques in health care, hospitals have also felt the impact of dramatic social and economic developments in the United States. Our population is growing; we are now a nation of some 170 million, and by 1967 if the present rate of increase continues, we may well have a population of almost 200 million. There is a continuing increase in the proportions in our population of the elderly and of the very young, although we

Dr. Crosby is the director and a former president of the American Hospital Association. He served as director of Johns Hopkins Hospital, Baltimore, Md., from 1945 to 1952, and as director of the Joint Commission on Accreditation of Hospitals from 1952 to 1954. In 1950 he was the United States representative on the Expert Subcommittee on Hospital Statistics of the World Health Organization.

are often inclined to overlook the proportionate increase of the very young.

Through our fine educational system, through the various medical, hospital, and public health organizations, and through the work of public information media, this vast American public is growing in knowledge about health services and becoming increasingly appreciative of the value of health. Good health care has become part of the increasingly higher standard of living which more Americans can now afford. The improving economic conditions of the last two decades have been accompanied by new concepts of the responsibility of employers, unions, and government at all levels for maintaining health.

As a result of this growth in numbers and in understanding of health care, the utilization of hospitals has risen rapidly. From 1946 to 1956 the number of admissions to all hospitals increased 41 percent, and admissions to nonprofit, short-term hospitals, the community hospitals, increased 54 percent. This increased use of hospitals is not due solely to increased population. In 1946, there were 112 admissions per 1,000 population to all hospitals, and in 1956 there were 132 admissions per 1,000 (*2*).

Meanwhile, the financial problems of hospitals have changed too. The costs of new buildings and of renovating old hospital facilities have been rising. Voluntary hospitals are no longer simply philanthropic institutions supported by private donations. Hospitals today are dependent on fees from patients or third parties such as Blue Cross, insurance companies, and public welfare agencies. Increased costs of operation have forced them to become business organizations. They are concerned with balancing budgets and defining the full cost of services in order to collect from the patient, or in his behalf, the amounts necessary to sustain the hospital's operations.

Thanks to the growth of prepayment, the hospital as an economic organism is now more stable than ever before. But the public has yet to fully realize the dollar cost of health care. People want the best in health care. It must be paid for, in one way or another. Hospital and other workers in the health field must support the idea that people should set aside enough from their current income to enable them to pay for the best of care. We are responsible for seeing that they get a full dollar's worth of care for every dollar spent.

We in hospital careers feel the impact of revolutionary medical and social advances, and we are doing our best not only to adapt to them but also to advance hospital care as rapidly as possible.

Hospitals and Public Health

I would like to discuss one important aspect of hospital care, the hospital as a community health center. The community's investment in the hospital can best be realized when hospitals and public health authorities work together with the medical profession as partners in the teaching and practice of preventive medicine and public health. The relationship between the hospital and the public health profession has been, and continues to be, an important area for study, discussion, and action.

However, I would like to consider the hospital's contribution to the health of the public in a wider context; to describe some ways in which the hospital may serve its community; and finally, to discuss ways in which the public, through the hospital, may help improve the public health.

For many years, the hospital was virtually an island of curative medicine. To be sure, many hospitals thus insulated did a remarkably good job of serving their communities. But just as the practitioner of medicine can no longer limit his tools to his black bag, the average hospital today cannot offer the best care while limiting its resources to the skills found within its walls. If the hospital lives as an island in the community, concerned only with the patients who pass through its doors, not thinking whence they come or where they go, it is an incomplete public servant; it does not fully meet public demands.

I have heard Dr. Mackintosh say that while the function of hospitals today is "to care for the sick, in the future their function will be not to care for the sick, but rather the well." He emphasizes, and I agree with him, that its public health responsibility is one of the major functions of the hospital. In his words, "The good hospital acts as an intelligence service

sending out, as necessary, danger warnings for the protection of the public. Its function is to watch the movement of sickness, to act early and with dispatch before great harm is done. . . . Sickness is an incident in the life of an individual, but to the hospital and its staff, sickness is a challenge, a focus of enquiry from which prevention should radiate as well as cure." As early as 1936, the Committee on Public Health Relations of the American Hospital Association, of which Dr. Wilinsky was chairman, stated that newer conceptions of an adequate community health program emphasize "the gradual disappearance of the line of demarcation between the prevention and the treatment of disease" (*3*).

In fact, preventive medicine has long been a joint responsibility of the hospital and health departments. The hospital assists the work of the health department by deeds such as registering births and deaths; detecting and reporting communicable diseases; treating patients with tuberculosis and poliomyelitis; and continuing the never-ending fight against infection, a fight recently dramatized by the appearance of resistant strains of *Staphylococcus aureus*. The health department, especially in rural areas, may use the laboratory and other clinical facilities of the hospital. The hospital practices the principles of maternal, infant, and child hygiene, and tries to educate the patient and his family in these and other matters of health and hygiene.

The Ford Foundation reports that many hospitals used part of their foundation grant to improve educational facilities for the communities they serve; that they organized educational programs on such aspects of preventive medicine as maternal and child care, sex education, nutrition, mental hygiene, and early detection of serious diseases; and that their social service and outpatient departments "combine treatment with instruction in solving family health problems" (*4*). In the outpatient work of the hospital, cooperation between the health department and the hospital is closest. As the patient leaves the hospital, he is followed by the health department, which sees that the hospital's achievements are not lost and that he is restored to the greatest possible self-reliance.

Hospitals are also working out other new programs to extend their services to their communities. Individual hospitals and hospital associations are undertaking research in management aimed at expanding the hospital's responsibilities in community health protection. Subjects of such studies have included the planning of the hospital's physical plant, the improvement of food service, the possibility of organizing regional cooperation between large and small hospitals, and the development of new programs of outpatient and home care.

In another expansion of their service to their communities, hospitals are extending their emergency responsibilities beyond that of routine service in disaster planning: the resourceful organization of emergency equipment and procedures to save lives when natural or mechanical catastrophes engulf numbers of people. To be ready for communitywide emergency situations—whether fire, flood, tornado, or train or plane crash—hospitals are cooperating in planning with public health, civil defense, and other community agencies.

Another hospital activity, no longer new but of the utmost importance, is the voluntary program of hospital accreditation. Accreditation means that the quality of patient care in the hospital meets adequate standards. It is a stamp of approval conferred by the Joint Commission on Accreditation of Hospitals, an independent group formed in 1952. The public is becoming aware of the distinction between accredited and nonaccredited hospitals; the hospital which requests a survey and achieves accredited status, or is earnestly working toward that goal, vouches to the community that it is serving its best interests. Accreditation is a voluntary program of continued self-inspection, the strongest arm of freedom of medicine and hospitals. Through accreditation, hospitals indicate to their communities that with independence in a free society goes the responsibility to measure up to society's demands. National recognition that hospitals are striving to improve their services is indicated by the recent Ford Foundation grant to establish voluntary counseling service to help hospitals improve their administrative services and, as a result, their patient care.

Extending Services

Four aspects of extending the hospitals' services into the community seem to me especially adventurous and important: planned cooperation between large and small hospitals, new rehabilitation programs, new types of care for the chronically ill, and new concepts of outpatient care.

We still need more precise definition of the elements of institutional care of the sick. Such definition would lead to more effective and economical care. The community hospital of the future will not stand alone, but must be linked in some organized way with other institutions. With such a link difficult problems can easily be referred to centers with more specialized facilities, and the staffs of outlying institutions can benefit regularly by visits from specialists from the more central and highly developed hospitals. Every community should have a carefully developed plan for orderly integration between health and welfare agencies and the various institutions offering health services.

I would make three suggestions to guide planning. First, the community plan must assure that each patient is treated in the type of institution that his condition requires. Second, we must organize professional disciplines and physical equipment to focus on special treatment problems, grouping patients according to need and where care can best be given. Third, patient transfer is a two-way street. We must move toward broader acceptance of transfer of patients from small hospitals to large medical centers as patient care dictates. And conversely, we must arrange for movement of patients from general hospitals to nursing homes, convalescent homes, or home care programs.

Rehabilitation, the second important aspect, is vital in the changing therapeutic picture. I have often thought that almost every patient who enters a hospital is in need of some kind of rehabilitation, whether a brief but encouraging chat, a mild form of special exercise, or, in more seriously disabled cases, intensive physiotherapy and psychotherapy. All members of the hospital staff will need to understand the importance of rehabilitation in the early stages of a patient's illness.

I believe that if we are to bring the benefits of rehabilitation services to communities—including the smaller ones—then the hope for establishing and developing such services rests with the community hospital. A centrally located rehabilitation center may be able to serve the patients of several hospitals in the area. These centers might have not only medical and directly allied facilities but also such services as vocational testing, guidance, and training.

Many hospitals now include rehabilitation among their services, but as Dr. Theodore Klumpp has pointed out, "The hospital is still only a repair shop where broken bodies are sent to be mended" (*5*). I would agree with him that some day it will also be a maintenance shop where the most intricate mechanism in the world will be sent to find out how it can best be cared for to prevent damage. The development of proper rehabilitation services in a community is one of the greatest challenges facing hospitals.

Problems relating to the illnesses that accompany middle and later life are a third growing concern in the health field. In fact, meeting the challenge offered by our increasing number of aging persons is probably the single greatest problem we face. George Bugbee, president of the Health Information Foundation, has reported that the group over 65 incurs 13.1 percent of all charges for health services although it constitutes only 8.4 percent of the population (*6*). And the problem will become greater. Today, more than 13 million people are 65 years of age or older, and by 1980, 1 out of every 7 people will be 65 or older, while 2 out of 5 will be 45 or older.

Because much of the illness that hospitals see will be chronic, hospitalization will generally be a relatively short episode in a long course of treatment, and care will have to be continued at home. In the future services provided at home cannot be limited, as they generally have been in the past, to those performed by doctors and nurses. The full range of services now provided only to the hospital inpatient must be properly adapted to home care.

New concepts of outpatient care open a fourth area of expanding hospital service. Along with the other revolutionary trends in hospital care will come the death of the old idea that ambulatory care is only for the poor. Very slowly,

forced by a combination of economics, science, and good old-fashioned common sense, we are accepting the idea of ambulatory service to the whole community. Community hospitals take bed patients of all income groups, and in the future hospitals will probably eliminate financial distinctions among ambulatory patients as well. For both ambulatory and bed patients, it is becoming clearer that prepayment will be the means of paying hospital bills for the self-supporting, while tax funds assist the medically indigent and cover the cost for the indigent.

A major fault in our organizational plans for the care of ill persons has been that the plans seem to encourage patients to lie down in hospital beds in order to be eligible for prepayment benefits. Without the benefit of prepayment it is only natural for people to delay seeking the care they need. In the interest of good community health we must encourage prepayment plans to offer more complete coverage, adding to basic inpatient coverage on a service benefit basis both extended benefits and protection for the ambulatory patient.

Need for Research

In considering regional cooperation, outpatient care, and other new demands upon the hospital, I am repeatedly impressed with the problems of hospital administration and with the urgent need for hospitals to expand research into all phases of their operation. Hospital administration is being recognized as the demanding science and art that it is. With its singular system of relationships among the trustees, medical staff, administrator, other personnel, and volunteers, the hospital, of all institutions that I know, is the most difficult to administer. It is also one of the most satisfying. If the administrator is a skillful manager, he can help the complex health team work better together in the interest of the patients and their community. I predict that hospitals will become even more complex institutions to administer in the years to come. Two reasons for this prediction can be summed up in two words: costs and personnel.

The cost of hospital care has been rising, and there is no denying that it will continue to rise. A well-reasoned but admittedly conservative estimate made in 1954 was an increase at the rate of 5 percent per year (*7*). From 1955 to 1956, the increase was 9 percent (*2*). Providing facilities and personnel for a widening range of services grows more expensive every year. The total expense of the Nation's short-term, nonprofit, general hospitals rose 223 percent from 1946 to 1956. Better patient care today means both more skilled personnel to provide new technical services and simply more personnel of all types. In nonprofit, short-term hospitals, our community hospitals, personnel increased from 156 per 100 patients in 1946 to 213 per 100 patients in 1956 (*2*). No wonder payroll expense cuts the largest chunk from the hospital's budget, more than 60 percent of the total expense of nonprofit, short-term, general hospitals in 1956.

At the same time that the number of personnel has been increasing, the number of hours in the workweek of hospital personnel, like those in offices and factories, has been decreasing. The difference is that the hospital must operate 24 hours a day, 168 hours a week, 52 weeks a year, always ready for any emergency. The shorter workweek has frequently been helpful in attracting additional qualified personnel, but because of the around-the-clock nature of the hospital's activities, it has also necessitated many more workers, a larger payroll, higher costs, and inevitably higher charges.

As hospitals convert the results of medical research into ever more comprehensive patient care, they may reasonably expect that the percentage of the hospital budget allotted to payroll will rise to more than 70 percent. As wages rise generally, they must rise in hospitals. Hospital administrators in virtually every community face an acute and seemingly chronic shortage of personnel. Hospital careers offer well-recognized satisfactions of service, association with the aura of medical learning, and the prestige of the uniform of healing. But recruitment will not be easier until hospitals can compete with other employers' wages. Hospitals must make sure that they use their staff wisely and do not waste talent and training.

Automation can never be the complete answer for personal service institutions; reducing costs by increasing productivity is far more difficult in hospitals than in industry.

Yet I am optimistic enough to think that studies will show us how automation can be exploited more fully, for example, in food service, laundry, central supply, and other such departments. Through improved methods and work simplification, hospitals will undoubtedly be able to increase the efficient use of workers' time. We must stop viewing with alarm the rising costs of hospital care, but we must not cease our efforts to keep costs down to the minimum consistent with maximum quality. Hospitals must demonstrate to the public that they recognize the need for economical operation in line with sound business procedures.

Solutions to the problems created by rising costs and shortages of personnel as well as the radical changes in the patterns of patient care will be worked out through research by hospitals' administrative staffs, by all members of the health team, and by social scientists. We often think of research in terms of new drugs, new surgical techniques, and other giant steps in the march of medicine. There is other research that is conducted with as much sincerity of purpose and with results as directly related to patient care. After all, it is the hospital with its laboratories, clinics, and operating facilities that makes it possible for the physician to practice modern medicine.

Until lately research in hospital administration was sparse. We have finally been able to get underway, through foundation and Hill-Burton funds, the organized program of hospital research which we have desired for so long. The American Hospital Association has strenuously urged increased recognition of the importance of research. It was instrumental in setting up two important national research groups. One, the Commission on Hospital Care, offered the first analysis of the extent to which the Nation's health resources were meeting the increased demand for health services (*8*). The commission's report prescribed a much-needed pattern for orderly planning of health facilities, a pattern which influenced the development of the very successful Hill-Burton program.

The second, the Commission on Financing of Hospital Care, did the first comprehensive analysis of the basic problems in financing hospital care for the American people (*9*). The American Hospital Association also participated in the Commission on Chronic Illness, which has completed a 7-year study of the problems of chronic disease, illness, and disability (*10*).

The Association led in the establishment of the Hospital Research and Educational Trust, a nonprofit, citizen-directed body to undertake needed research in hospital affairs. The trust has, from several sources, about $4.3 million programed in current research or pledged for future research. It is conducting studies of medical records, hospital licensure, need for future hospital facilities, and construction and design.

I would certainly predict that in the years to come hospitals of all sizes and types will become more active in conducting research. For too long we have thought research could be undertaken only in large medical centers. Actually, all hospitals can keep the accurate records which offer a basis for investigations to determine such things as the relation of social factors to disease and a community's actual and potential needs for various health services. All hospitals can undertake studies designed to evaluate and improve their administration. If we stop labeling these activities with the bogey-word "research," perhaps we can encourage acceptance of the fact that they can be undertaken outside university citadels of learning.

You may have noticed that in speaking of these research programs and the extension of hospital services to which they lead—in describing to you the ways in which today's hospital is living up to its responsibilities as a community health center—my point of view has been rather one-sided; I have been dwelling on the functions of the community it serves.

Adequate preventive as well as curative health care has become an accepted part of the high standard of living which most Americans are now able to attain. The potential consumers of medical care have a right to help plan for community health, and they are becoming more vocal in their desire to do so. I believe that health care can be no better than the people demand. I believe that the people should be as concerned as professional health personnel with the form and the cost of medical care, and the method of paying for it. In the

United States we are fortunate that we have an interested and aroused public, which, if it does not understand all the technical details of our work, understands a great deal more than we frequently give it credit for, and recognizes the importance of health care.

Our community hospitals are built by voluntary contributions from private citizens. Some 115 million Americans are identified with hospitals even before they set foot in one, either through Blue Cross or one of the many commercial insurance plans. The hospital cannot refuse to respond to the demands which the public need places on it. The community in turn must support its hospital. Support it with money, yes, and with a supply of personnel; but above all with a vivid understanding of the hospital's purpose and encouragement of the professional hospital team.

Lay Leadership

In trying to assess the hospital in the rapidly changing community health picture, I find one constant of great importance, a constant unique to the United States. Our community hospitals are truly governed, not by a professionally trained group, but by laymen, community leaders, who are better known for other personal achievements, but who have demonstrated an abiding interest in the community's welfare. Of course, our hospitals are not unique in this regard. Professional educators do not generally govern universities; military men do not establish final policy in the Department of Defense; and nuclear physicists do not speak the last word in the Atomic Energy Commission's decisions on the uses of atomic energy—or space satellites. Major institutions other than hospitals are governed by boards of so-called "lay" trustees. Yet the most highly developed forms of contributed service in our society are those centered in our hospitals, with their trustees, their volunteers, and their members of the religious orders. The story of the founding of every voluntary hospital in America always has a basic theme, contributed service.

The hospital trustees of the Nation—some 50,000 of them—are entrusted with the responsibility of setting policy in medical institutions where only the most expertly trained physicians and paramedical workers can translate the latest in scientific developments into the best of patient care. The point to remember is the desirability of this arrangement. The lay control of hospitals insures that the community's interest will never be overlooked.

Of course, hospital trustees and volunteers must be particularly sensitive to the hospital's purpose and needs. Theirs must be educated awareness, including a recognition of the need for good equipment and well-trained personnel, an understanding of the problems of the physician and his co-workers, and an effort to facilitate their dedicated labors. As professional health workers, we all have an obligation to educate our communities about the goals and means of health care.

The modern hospital has evolved, not step by orderly step, but by a series of rapid mutations which have not yet stopped. Advances in medicine and changing social and economic conditions are making new demands on the hospital. Its functions of caring for patients, educating future health workers, and serving as a medical research center reach outside its walls into the community. The American public is learning to demand more extensive health services. If the hospital is to maintain its place in the public esteem, it must be prepared to adapt to this demand.

Voluntary hospitals demonstrate how consumers of health services can be effective partners with the producers of these services. Such partnerships have obvious advantages and are bulwarks of strength to our free society. The degree to which the relationship succeeds in a hospital is a major factor in determining the quality of patient care, preventive medicine, and educational and research activities.

I believe that our voluntary hospital system, directed by lay leadership representative of the community, will continue to serve the people to the extent that the public desires service. In the voluntary hospital, the full partnership of an enlightened public, a learned and inspired medical profession, and a dedicated hospital administration represents an opportunity to offer the very best in health care. The American hospital was created out of the pattern of American democracy. It serves in a great tradition, and in the years ahead it will assume an even greater place as a community health center.

As an institution, it has done much and yet has much to do. It needn't be apologetic. It cannot be complacent. Its accomplishments and its challenges are succinctly stated in the Passavant motto: "More than yesterday. Less than tomorrow."

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Water Pollution Control

Continued pollution of stream by municipality's sewage system after decree enjoining pollution constitutes civil contempt of court by municipality and criminal contempt by individual officials failing to take necessary steps to abate pollution, *In re Borough of West Wildwood et al.*, 42 N. J. Super. 282, 126 A. 2d 233 (1956).

The Borough of West Wildwood was directed by a chancery court in 1934 to comply with an order of the New Jersey State Department of Health to desist and refrain from allowing its improperly treated sewage to flow into Post Creek or to correct the inadequacy by a specific date. Four times over a period of 20 years the borough was found guilty of contempt of this order. The first contempt was punished by a fine of $50 against each city councilman and $250 against the borough.

The second finding of contempt was followed by the borough agreeing to make the necessary corrections in the sewage treatment plant. After the third finding of contempt, the borough was directed to raise the necessary monies to complete the correction of the sewage treatment plant.

Upon the failure of the borough to comply with this direction, the court in January 1955 levied a fine of $5000 against the borough, in addition to a fine of $25 per day until it complied with the order and $500 against each councilman-defendant who voted "no" or refrained from voting on the borough ordinance providing for correction and installation of new sanitary sewage disposal facilities and authorizing issuance of bonds to help finance such construction.

On application for remission of fines the court remitted the fine levied against the borough upon condition that it be used for the amortization of some portion of its bonded indebtedness. The fines levied against the mayor and councilmen, which were imposed for criminal contempt, were held to be beyond the power of the court to remit after the expiration of 60 days from the date of judgment.

For cases involving a similar situation see *Department of Health of State of New Jersey* v. *Borough of Fort Lee*, 108 N. J. Eq. 139, 154 A. 319 (1931), and *In re Borough of Fort Lee*, 108 N. J. Eq. 425, 155 A. 473 (1931).

Presently evident trends in death rates from leukemia offer no support for a theory that leukemogenic factors in the American environment have increased sharply within the last 15 years.

Trends of Mortality From Leukemia in the United States, 1921–55

ALEXANDER G. GILLIAM, M.D., and WILLIAM A. WALTER, M.D.

SOME of the deficiencies in the basic data available in the United States for studying the trend since 1921 of deaths attributed to leukemia have been cited by Sacks and Seeman (*1*). These limitations particularly involve the lack of comparability in the rubrics provided for leukemia in the several revisions of the International Lists of Causes of Death. Prior to the introduction of the fifth revision of these lists in this country in 1939, deaths charged to aleukemia were included with Hodgkin's disease. For this reason, in describing trends from 1921 to 1942, Sacks and Seeman only tabulated the "true leukemias." Cooke (*2*), however, has pointed out that in 1940 only 4.8 percent of all leukemia deaths were charged to aleukemia. These deaths yielded a crude aleukemia death rate of only 0.2 per 100,000, which should have little effect on trends whether included or not.

An additional difficulty with data for the United States, which is generally overlooked, is that all States were not included in the death registration area until 1933. In 1921 the registration States comprised only 58 percent of the land area of the country and less than 82 percent of the population. In 10 of the 14 States added to the death registration area since 1921, the standardized leukemia mortality ratios in 1949–55 were lower than the average for the United States (A. G. Gilliam and W. A. Walter, unpublished data). The effect of this changing composition of the death registration States on the trends of leukemia mortality cannot be determined. Beginning in 1933, however, the data available and presented here refer to the entire United States, and beginning in 1939 include those deaths charged to aleukemia.

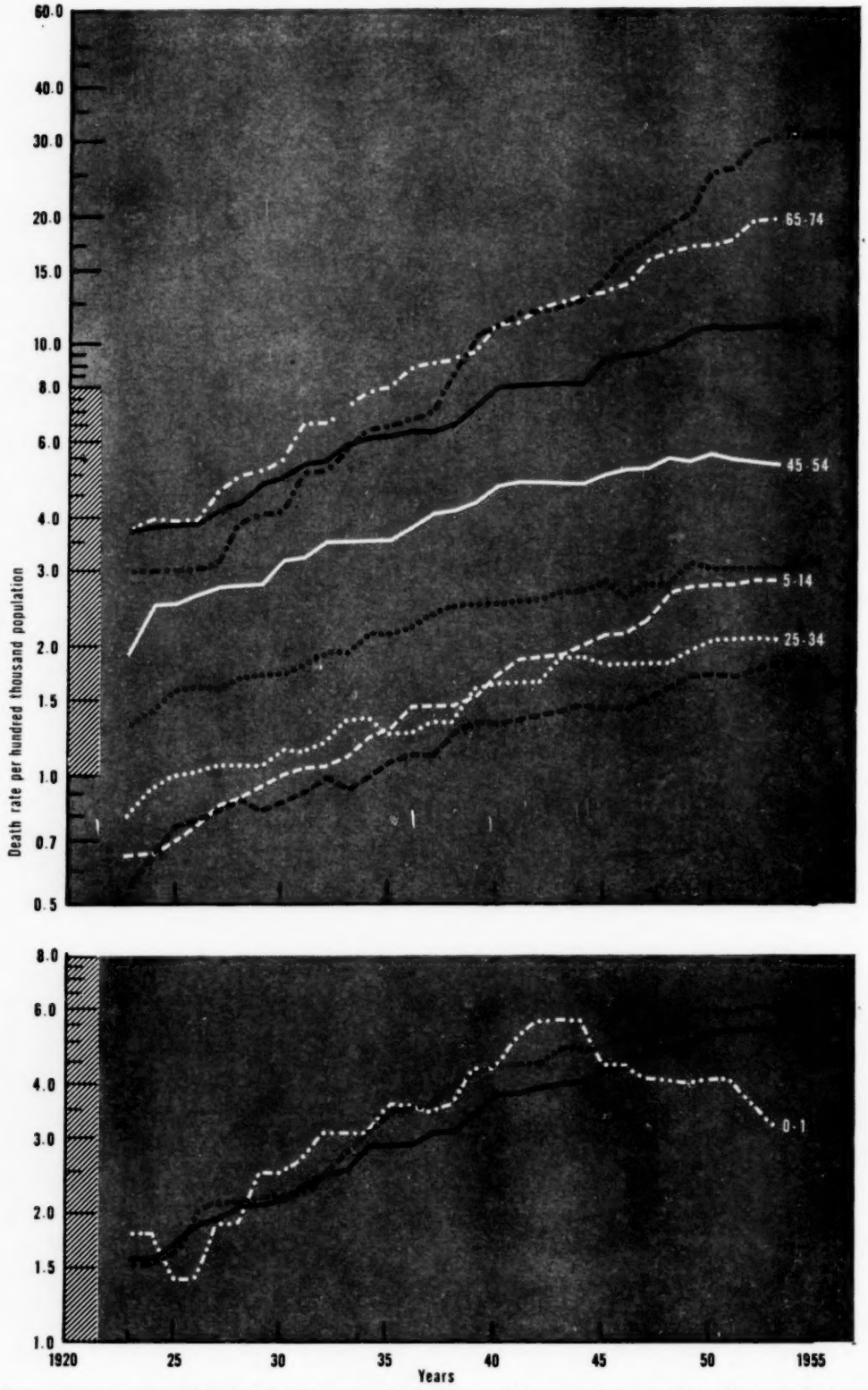
Sacks and Seeman, and Cooke, too, have pointed out that, while there has been a continuous increase in mortality from leukemia, the greatest increase has been in the older ages. In addition, Cooke has noted that in the age groups 0–4 and 0–14 the rate of increase was less between 1940 and 1949 than was observed in the previous 10 years.

To extend the observations of these authors, age-specific mortality rates for each race and sex were computed for each year 1921–55, for the registration States. The age-specific rates derived for white males and females are shown in figures 1 and 2. To achieve some degree of smoothing of annual variation, 5-year moving medians are plotted in figures 1 and 2 rather than the actual annual rates. Furthermore they are charted on a semilogarithmic scale so that changes in rate of increase may be visually evident.

With regard to the age-adjusted rates of leukemia mortality for both males and females of

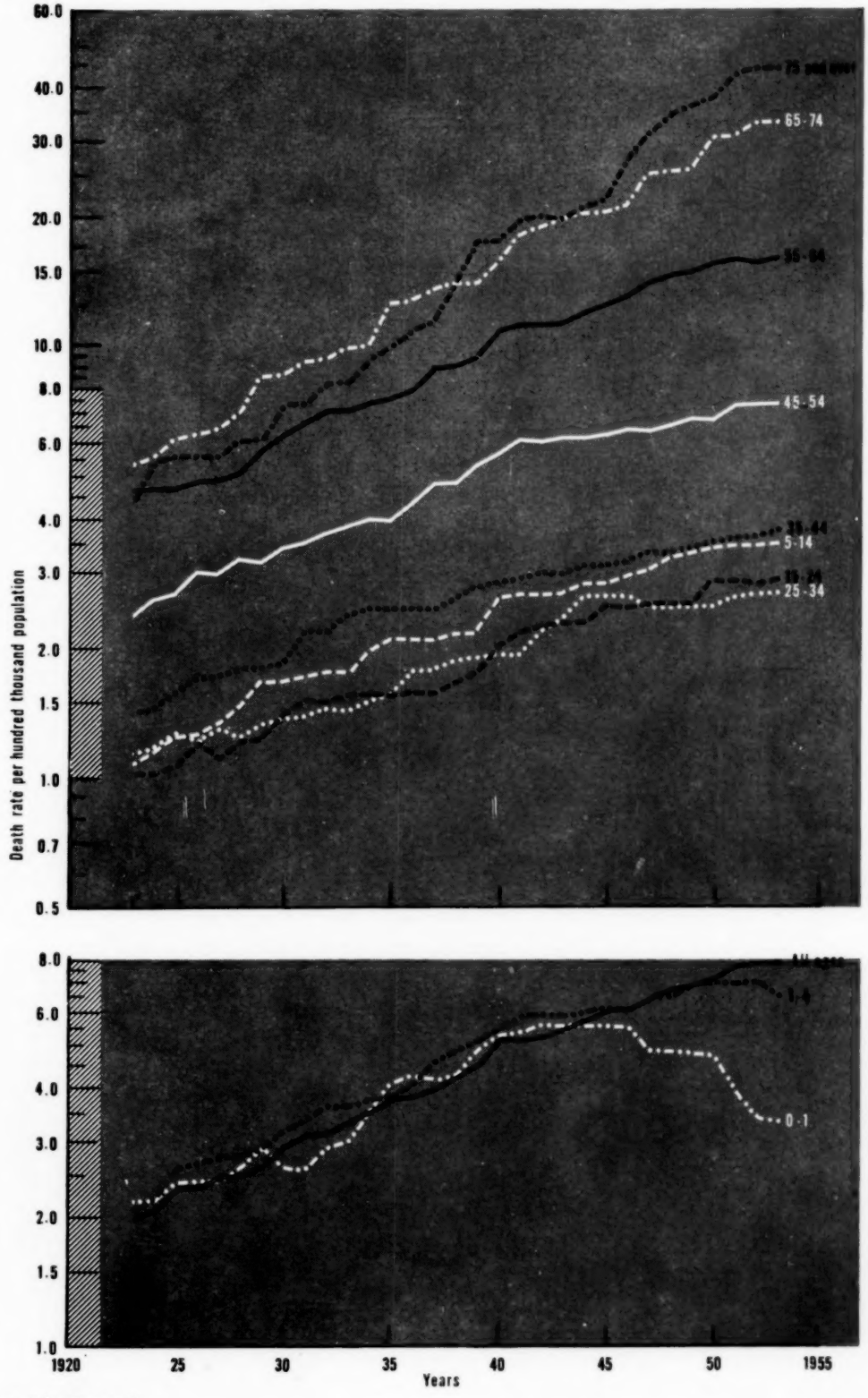
Dr. Gilliam and Dr. Walter are epidemiologists with the Field Investigations and Demonstration Branch, National Cancer Institute, National Institutes of Health, Public Health Service.

Figure 1. White females: trends of age-specific death rates for leukemia in the death registration States, 5-year moving medians, 1921–55.



NOTE: Rates for all ages adjusted to the age distribution of the population of the United States at the 1950 census. International List numbers included are: 65a, 1921–29; 72a, 1930–38; 74a,b, 1939–48, and 204, 1949–55.

Figure 2. White males: trends of age-specific death rates for leukemia in the death registration States, 5-year moving medians, 1921–55.



NOTE: See note, figure 1.

all ages, there would appear to be no change in rate of increase in the few years before and after 1933, the year in which all States were finally admitted to the death registration area. Beginning about 1940, however, there is a definite decline in the rate of increase, which would appear to be more pronounced among females than among males.

When trends for individual age groups are examined it is observed that there has been a substantial decline in leukemia death rates for both males and females under 1 year of age since about 1940. In all other age classes, with the exception of those of 75 years or older, the rates have been increasing but the magnitude of increase has been declining. The decline in rate of increase, which is very evident in the younger ages, tends to be progressively less pronounced with advance in age. For those 75 years and older there is no discernible change in rate of increase.

In addition to this decline in rate of increase, there appears to be a tendency since 1950 for actual leveling off of rates in several age

Table 1. Average annual leukemia death rates among white males and females for seven 5-year periods, 1921–55, and annual percentage change in rates [1]

Years	Age groups (years)										
	0–1	1–4	5–14	15–24	25–34	35–44	45–54	55–64	65–74	75+	All ages [2]
Male	Average annual death rate per million										
1921–25	21.6	23.0	10.8	10.2	11.4	14.0	23.8	46.6	52.4	44.6	20.4
1926–30	26.4	28.0	14.8	12.0	12.7	17.9	31.2	53.4	72.5	61.2	25.6
1931–35	33.4	35.9	17.7	15.0	14.9	23.9	37.0	73.1	100.3	87.3	33.1
1936–40	45.4	48.8	22.1	17.0	18.2	26.6	49.8	89.4	135.6	147.0	42.8
1941–45	48.4	58.3	26.9	24.7	22.8	29.6	57.3	113.7	184.9	198.4	53.8
1946–50	46.2	63.8	31.0	23.8	24.8	32.7	64.8	114.9	245.6	329.4	65.7
1951–55	31.5	65.8	35.6	27.6	25.6	36.4	71.4	155.2	320.4	475.3	77.1
Female											
1921–25	17.5	14.9	6.6	6.2	8.8	13.1	22.4	35.5	36.7	30.5	15.4
1926–30	19.5	22.0	9.0	8.5	10.9	16.8	27.4	43.6	51.4	35.6	19.9
1931–35	29.7	27.4	11.5	9.3	13.2	19.5	34.1	56.2	73.5	55.1	25.5
1936–40	38.9	39.0	14.6	12.1	14.4	23.3	41.4	66.4	92.1	87.0	31.9
1941–45	50.7	46.5	18.8	13.9	17.4	25.9	46.0	80.4	122.4	120.8	38.9
1946–50	40.2	53.0	24.2	15.1	18.4	27.6	52.0	97.9	154.9	191.5	46.5
1951–55	35.8	57.5	26.9	16.5	19.4	29.8	53.0	105.5	190.5	287.3	53.2
Male	Annual percentage change in rates										
1921–25											
1926–30	4.1	4.0	6.6	3.3	2.2	5.1	5.5	2.7	6.7	6.6	4.6
1931–35	4.8	5.1	3.6	4.6	3.2	6.0	3.5	6.5	6.7	7.4	5.3
1936–40	6.3	6.4	4.5	2.5	4.1	2.2	6.1	4.1	6.2	11.0	5.3
1941–45	1.3	3.6	4.0	7.8	4.6	2.2	2.9	4.9	6.4	6.2	4.7
1946–50	−1.0	1.8	2.9	−.7	1.7	2.0	2.5	.2	5.8	11.0	4.0
1951–55	−7.4	.6	2.2	3.0	.6	2.2	2.0	6.2	5.5	7.6	3.3
Female											
1921–25											
1926–30	2.2	8.1	6.4	6.7	4.4	5.2	4.1	4.2	7.0	3.2	5.2
1931–35	8.8	4.5	5.1	1.7	3.9	3.1	4.5	5.2	7.4	9.1	5.1
1936–40	5.5	7.3	4.9	5.5	1.8	3.6	4.0	3.4	4.6	9.6	4.6
1941–45	5.5	3.6	5.2	2.7	3.8	2.1	2.1	3.9	5.8	6.8	4.0
1946–50	−4.6	2.7	5.3	1.7	1.1	1.3	2.4	4.0	4.8	9.6	3.7
1951–55	−2.3	1.6	2.1	1.9	1.0	1.5	.4	1.5	4.2	8.4	2.7

[1] Annual percentage change in rates from one time period to the next, computed by the compound interest formula.
[2] All ages adjusted to the age distribution of the United States population at the 1950 census.

groups. The leukemia experience of the next 5 years should be sufficient to demonstrate whether this represents a temporary slackening in increase in rates or a beginning reduction similar to that already observed among infants under 1 year of age.

A plot of the leukemia death rates for nonwhites has also been prepared, but because of the irregularities due to the small numbers of deaths involved, it is impractical to illustrate them. It may be said, however, that the increase among nonwhites has been materially greater than among whites, with less evidence of a slackening in rate of increase. Such reduction in increase among nonwhites as is evident in annual rates occurred about 1948, instead of in 1940, and is less marked than among whites. In addition, the reduction in rate of increase is only apparent among males under 5 years of age and among females under 35 years.

As a further test of changes in leukemia mortality rates since 1921, average annual age-specific death rates have been computed for

Table 2. Average annual leukemia death rates among nonwhite males and females for seven 5-year periods, 1921–55, and annual percentage change in rates [1]

Years	Age groups (years)										
	0–1	1–4	5–14	15–24	25–34	35–44	45–54	55–64	65–74	75+	All ages [2]
Males	Average annual death rate per million										
1921–25	6.6	5.7	3.0	5.3	8.2	10.8	13.8	18.8	7.7	9.8	8.6
1926–30	19.3	5.9	5.3	8.6	8.4	11.5	12.7	11.0	25.7	7.8	10.1
1931–35	22.5	9.8	8.5	9.0	11.3	16.7	18.3	28.9	20.9	28.9	14.7
1936–40	18.5	12.3	9.0	10.3	14.7	21.3	33.8	46.0	32.5	33.1	20.4
1941–45	25.7	15.3	12.6	13.8	18.8	26.0	42.6	55.0	53.7	36.8	26.2
1946–50	46.3	24.0	14.1	16.6	19.2	30.7	48.4	88.3	87.9	62.5	35.0
1951–55	35.8	27.2	18.3	23.5	23.2	35.3	59.5	117.7	175.7	159.1	49.3
Females											
1921–25	2.2	5.8	3.5	4.0	4.3	6.6	12.0	8.2	14.0	9.1	6.4
1926–30	5.6	8.0	4.0	3.9	4.4	10.9	11.8	13.6	5.6	------	7.1
1931–35	15.3	7.7	4.0	4.4	10.7	11.0	17.3	17.8	6.8	11.5	9.8
1936–40	24.5	10.7	5.3	8.6	10.4	19.1	26.0	28.0	15.7	12.4	14.6
1941–45	28.6	16.6	8.5	9.0	11.1	21.6	31.3	36.1	29.7	22.4	18.6
1946–50	25.7	17.2	10.9	12.4	14.5	23.3	35.9	46.0	44.0	29.8	22.6
1951–55	28.8	24.0	12.6	11.8	16.6	30.0	57.5	69.2	78.8	77.8	32.4
Males	Annual percentage change in rates										
1921–25	------	------	------	------	------	------	------	------	------	------	------
1926–30	23.8	0.7	12.4	10.0	0.6	1.4	−1.6	−10.0	27.4	−5.0	3.1
1931–35	3.2	10.6	9.9	.9	6.2	7.7	7.5	21.2	−4.1	30.1	7.9
1936–40	−3.8	4.8	1.2	2.7	5.3	5.1	13.1	9.8	9.3	2.8	6.7
1941–45	6.8	4.4	6.9	6.0	5.0	4.0	4.7	3.6	10.6	2.1	5.2
1946–50	12.5	9.4	2.2	3.8	.5	3.4	2.6	10.0	10.4	11.2	5.9
1951–55	−5.0	2.6	5.4	7.2	3.9	2.8	4.2	5.9	14.8	20.6	7.1
Females											
1921–25	------	------	------	------	------	------	------	------	------	------	------
1926–30	21.0	6.9	2.9	−.8	.4	10.7	−.3	10.6	−16.7	------	2.2
1931–35	22.2	−.9	−.8	2.4	19.8	.2	8.0	5.5	4.0	------	6.4
1936–40	9.9	6.8	6.0	14.5	−.5	11.7	8.5	9.6	18.2	1.4	8.4
1941–45	2.4	9.3	9.8	.9	1.2	2.5	3.7	5.2	13.5	12.7	4.9
1946–50	−1.4	.7	5.1	6.6	5.6	1.5	2.8	4.9	8.2	5.8	4.0
1951–55	2.3	6.9	2.8	−.9	2.8	5.2	9.9	8.5	12.4	21.2	7.5

[1] Annual percentage change in rates from one time period to the next, computed by the compound interest formula.
[2] All ages adjusted to the age distribution of the United States population at the 1950 census.

seven 5-year periods during 1921–55, for each race and sex class. These are shown for whites in table 1 and for nonwhites in table 2. In addition, the annual percentage changes in rates from one time period to the next have been computed by the compound interest formula and are shown in the tables. The annual percentage changes in rates as given for whites in table 1 are in complete conformity with the trends of moving medians of annual rates which were shown in figures 1 and 2 and which have been described above.

For nonwhites, on the other hand, the annual percentage changes from one time period to the next, which are shown in table 2, are clearly too irregular to suggest any stabilization in rate of changes in rates for this race.

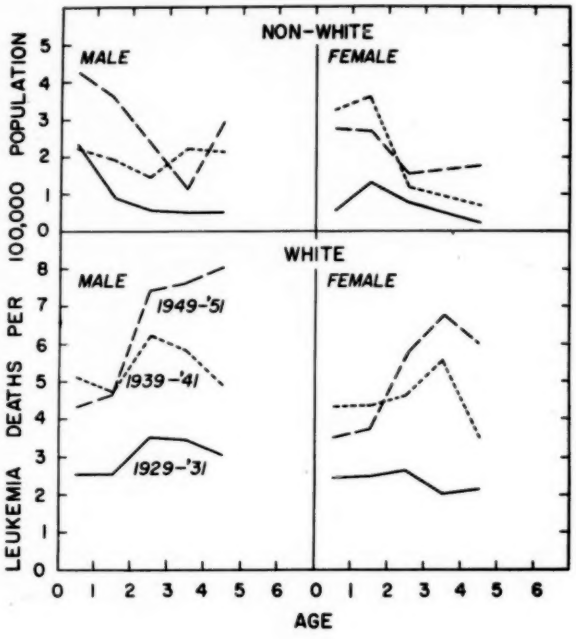
It may be added in passing that, among industrial policyholders of the Metropolitan Life Insurance Company, the total age-adjusted death rates from leukemia declined between 1951 and 1954, the last year for which rates were published (*3*). Whether or not this represents a temporary fluctuation, or a real decline in rates for this group, remains to be seen.

Persons Under 5 Years of Age

Hewitt (*4*) has extended the observation of Cooke (*2*) that leukemia tended to show a peak of occurrence in the third and fourth years of life. Walter and Gilliam (*5*) showed that this peak was present during 1949–51 for the white but not for the nonwhite population of the United States. In view of these observations, more detailed examination of mortality data for persons under 5 years of age appeared desirable. Accordingly, average annual death rates for single years under 5 were computed for 3-year periods centering around the censuses of 1930, 1940, and 1950. The results are shown in figure 3. Although the data for nonwhites are based on small numbers, there is in the three time periods a general tendency in this race for the rates to decline after the first year of life. Among white males, to the contrary, there is an opposite tendency which is present to some extent in all three time periods. Among white females, the latter general tendency is evident in the last two periods although not in the first.

Examination of mortality trends for the ages

Figure 3. Leukemia death rates for single years of age under 5 years for 1929–31, 1939–41, and 1949–51.



under 5 years during intercensal years is unprofitable because of the unavailability of reliable estimates of the populations at risk. Since 1940, however, the Bureau of the Census has published estimates (*6*) of the population for the ages under 1, 1 and 2, and 3 and 4 years. Leukemia death rates for each year, 1940 to 1955, inclusive, have been computed from these estimates, and the results for white males and females are plotted on a semilogarithmic scale in figure 4. For both sexes there is a regular decline in the rates for infants under 1 year old, which is offset in about the same degree by a rise in rates for children 3 and 4 years of age. Among females 1 and 2 years old the rates have remained at a fairly constant level, while in the males of these ages there is a tendency towards a decline in rates since about 1950.

Among the nonwhites the annual fluctuations arising from the small numbers of deaths make it impossible to form reliable conclusions about trends for these ages.

Lifetime Probability of Dying of Leukemia

Throughout the entire life span from birth onwards, the probability of dying of a disease

is a function not only of changing age-specific mortality due to that disease, but of changing survivorship from all other competing causes of death. As is well known, there have been marked fluctuations during the last 25 years, in the United States and elsewhere, with respect to expectation of life and causes of death in general. To estimate the combined effect of these general forces, together with annual changes in leukemia mortality, the lifetime probability of dying of leukemia has been computed for 6 years, distributed at 5-year intervals 1930 to 1955, inclusive, by a method from Spiegelman (*7*), which employs United States life tables and age-specific leukemia mortality for each year listed. The results of these computations are shown in table 3 for both races and for each sex. The percentage change in probability of dying of leukemia during each 5-year interval is also shown in the table.

In 1930 the betting odds were 185 chances in 100,000, or slightly less than 0.2 percent, that a white male would eventually die of leukemia. By 1955 this probability had risen to 684 chances in 100,000, or a little less than 0.7 percent. Changes of a similar kind, although of different degree, are noted for white females and for nonwhites of each sex.

Figure 4. Trends of leukemia death rates for white males and white females under 1, 1 and 2, and 3 and 4 yecrs of age, 1940–55.

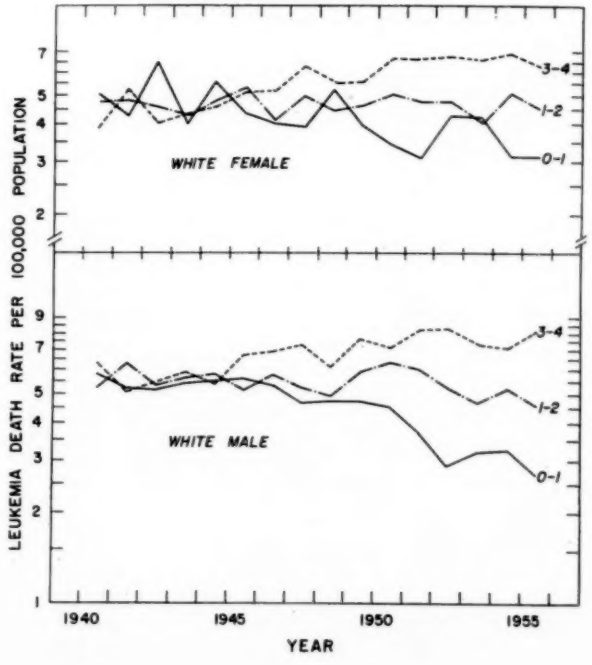


Table 3. Changes in lifetime probability [1] of dying of leukemia, from birth onward

Year	White		Nonwhite	
	Males	Females	Males	Females
	Lifetime probability of dying of leukemia			
1930	0. 00185	0. 00150	0. 00059	0. 00032
1935	. 00243	. 00198	. 00083	. 00057
1940	. 00350	. 00287	. 00149	. 00088
1945	. 00418	. 00357	. 00166	. 00118
1950	. 00579	. 00499	. 00240	. 00193
1955	. 00684	. 00576	. 00348	. 00260
	Percent increase in probability			
1930–35	31	32	41	78
1935–40	44	45	80	54
1940–45	19	24	11	34
1945–50	38	40	45	64
1950–55	18	15	45	35

[1] Computed from United States Life Tables and age-specific leukemia mortality for the indicated years, by a method from Spiegelman (*7*).

The percentage increase in probability of death from leukemia for each 5-year interval is shown in the lower half of table 3. The rate of increase is greater for nonwhites than for whites, but in all classes there is a distinct tendency toward a decline in rate of increase. Also, the changes in rate of increase, as estimated from lifetime probabilities, are less regular and are subject to greater fluctuation than when estimated from the annual probability of dying of leukemia, as shown in figures 1 and 2.

In view of the impossibility of determining from figure 4, with any degree of assurance, that the decline in death rates for infants under 1 year of age is entirely offset by the increase in rates for children 3 and 4 years of age, the probability of dying of leukemia during the first and second 5 years of life (birth to 5th birthday and 5th to 10th birthday) has been computed and is shown in table 4. The table shows that between 1950 and 1955 there has been a slight decline in accumulated risk of dying of leukemia in the first 5 years of life.

Table 4. Probability of dying of leukemia [1]

Year	During first 5 years of life				During second 5 years of life			
	White		Nonwhite		White		Nonwhite	
	Male	Female	Male	Female	Male	Female	Male	Female
1930	0. 00014	0. 00010	0. 00006	0. 00002	0. 00011	0. 00006	0. 00004	0. 00001
1935	. 00016	. 00015	. 00005	. 00003	. 00010	. 00008	. 00005	. 00001
1940	. 00026	. 00021	. 00011	. 00007	. 00016	. 00011	. 00008	. 00003
1945	. 00027	. 00024	. 00010	. 00008	. 00015	. 00012	. 00009	. 00004
1950	. 00030	. 00026	. 00014	. 00009	. 00019	. 00016	. 00010	. 00009
1955	. 00026	. 00023	. 00010	. 00009	. 00022	. 00014	. 00012	. 00006

[1] See footnote table 3.

Taken together with the trends of annual death rates for the ages under 1 year and 1 to 4 years (figs. 1 and 2), this strengthens the belief that this reduction may be real and not a fluctuation such as was observed in the other direction between 1945 and 1950. Regardless, however, of the certainty which might be placed in this conclusion, the table clearly shows that the risk of dying of leukemia in the first 5 years of life has at least been stabilized since 1940. During the second 5 years of life, on the other hand, there has been a perceptible, though slight, increase since 1940 in the probability of dying of leukemia.

Individual States

Unpublished tables are available from the National Office of Vital Statistics which give leukemia deaths, by age, for each State since 1935. Prior to 1942, however, deaths were assigned to the State in which death occurred rather than to the State of residence of the decedent. No information is available to determine whether or not the leukemia deaths recorded in some States prior to 1942 include any substantial proportion of nonresidents. With this reservation in mind, age- and race-adjusted death rates were computed by the indirect method for each State for three 3-year periods centering around the censuses of 1930, 1940, and 1950. The indirect method employed involved multiplication of the 1949–51 age-specific rates for the United States as a whole, for whites and for nonwhites separately, by the corresponding State populations as enumerated at the 1930, 1940, and 1950 censuses. This procedure yielded the deaths expected in each State during each period, on the basis of the 1949–51 experience of the white and nonwhite populations of the entire United States. The observed deaths, divided by those expected on this basis, yield a ratio which, when multiplied by the crude rate for the United States for 1949–51 (58.18 per million), gives the State rate adjusted for age and race.

Table 5 shows the leukemia mortality rates for each State grouped in standard geographic regions. The percentage increases in rates between 1930 and 1940, and between 1940 and 1950, are also given. Rates for the entire United States increased 64 percent between 1930 and 1940 as compared with an increase of 43 percent between 1940 and 1950. This decline in rate of increase is evident in each geographic region except New England. In this area 3 of the 6 States showed increases in the rate of increase, but the number of deaths recorded for them forms a relatively small proportion of the total deaths credited to the entire region. All other regions show a decline in percentage increase, but 12 other States do not exhibit such decline. These include nearly half of the States in the East and West South Central regions, three in the South Atlantic, and half of those in the Mountain States. In general, these all represent States having relatively small populations or relatively low leukemia mortality rates, or both.

Since the basic data available do not give the race of decedents for many of the States during 1929 to 1931, comparisons cannot be made for changes in rate of increase for each race sepa-

Table 5. Trends of leukemia mortality in the geographic regions and States of the United States [1]

Region and State	Number of deaths recorded			Average annual age- and race-adjusted death rates per million			Percent increase in rates	
	1929–31	1939–41	1949–51	1929–31	1939–41	1949–51	1930–40	1940–50
New England	**649**	**1,045**	**1,787**	**27.5**	**39.9**	**57.6**	**45.1**	**44.4**
Maine	55	86	149	21.8	31.4	48.6	44.0	54.8
New Hampshire	38	50	109	25.4	30.8	58.8	21.3	90.9
Vermont	20	35	101	17.6	30.0	79.0	70.5	163.3
Massachusetts	368	580	910	30.3	43.1	57.5	42.2	33.4
Rhode Island	53	77	106	27.9	36.3	41.7	30.1	14.9
Connecticut	115	217	412	26.2	42.8	63.6	63.4	48.6
Middle Atlantic	**1,932**	**3,616**	**5,777**	**28.0**	**46.0**	**60.9**	**64.3**	**32.4**
New York	1,118	1,973	3,084	33.7	50.8	65.3	50.7	28.5
New Jersey	243	526	911	23.4	44.6	60.5	90.6	35.7
Pennsylvania	571	1,117	1,782	22.5	39.8	54.6	76.9	37.2
East North Central	**1,663**	**3,379**	**5,577**	**24.2**	**43.2**	**58.4**	**78.5**	**35.2**
Ohio	404	834	1,489	22.0	40.4	59.1	83.6	46.3
Indiana	177	362	709	18.8	34.4	56.4	83.0	64.0
Illinois	549	1,136	1,633	27.2	49.4	59.2	81.6	19.8
Michigan	297	610	1,045	23.6	41.7	55.4	76.7	32.9
Wisconsin	236	437	701	28.6	46.3	62.6	61.9	35.2
West North Central	**1,031**	**1,851**	**2,951**	**28.1**	**45.0**	**63.5**	**60.1**	**41.1**
Minnesota	272	473	739	38.2	56.8	75.9	48.7	33.6
Iowa	217	345	546	29.7	42.9	61.0	44.4	42.2
Missouri	275	461	739	26.9	39.8	56.3	48.0	41.5
North Dakota	31	85	109	18.3	47.9	58.1	161.7	21.3
South Dakota	[2] 31	75	137	26.0	40.8	67.0	56.9	64.2
Nebraska	86	177	286	22.7	44.3	64.6	95.2	45.8
Kansas	119	235	395	22.4	42.1	62.4	87.9	48.2
South Atlantic	**680**	**1,396**	**2,822**	**19.3**	**33.2**	**51.8**	**71.5**	**56.0**
Delaware	12	36	56	18.3	47.6	59.2	45.4	24.4
Maryland	127	178	338	30.4	36.4	52.1	19.7	43.1
District of Columbia	51	118	117	41.9	70.5	55.4	68.3	−21.4
Virginia	105	216	443	18.8	33.3	52.2	77.1	56.8
West Virginia	62	152	317	14.7	31.2	56.0	112.2	79.5
North Carolina	94	240	474	14.1	30.8	48.9	118.4	58.8
South Carolina	47	104	250	14.2	27.3	53.4	92.3	95.6
Georgia	100	221	439	16.6	32.1	52.4	93.4	63.2
Florida	82	131	388	23.9	26.7	48.1	11.7	80.1
East South Central	**352**	**772**	**1,595**	**15.8**	**30.0**	**53.1**	**89.9**	**77.0**
Kentucky	94	217	440	13.9	28.1	50.8	102.2	80.8
Tennessee	99	248	515	16.0	34.0	57.7	112.5	69.7
Alabama	94	178	366	17.2	28.9	49.4	68.0	70.9
Mississippi	65	129	274	16.6	28.6	54.4	72.3	90.2
West South Central	**226**	**1,006**	**2,180**	**16.1**	**31.5**	**55.2**	**95.7**	**75.2**
Arkansas	55	105	253	13.3	22.4	48.4	68.4	116.1
Louisiana	79	175	403	18.3	33.8	61.6	84.7	82.2
Oklahoma	92	180	358	16.4	29.2	53.0	78.0	81.5
Texas [3]	-------	546	1,166	-------	34.3	55.5	-------	61.8
Mountain	**199**	**399**	**821**	**21.0**	**35.2**	**55.9**	**67.6**	**58.8**
Montana	30	73	118	21.4	45.6	63.0	113.1	38.2
Idaho	30	46	105	25.8	31.7	59.9	22.9	89.0
Wyoming	9	24	39	16.5	36.4	47.3	120.6	29.9
Colorado	68	132	234	23.8	39.3	56.3	65.1	43.3
New Mexico	6	33	86	6.0	25.7	49.9	328.3	94.2
Arizona	19	38	104	19.2	31.3	52.4	63.0	67.4
Utah	32	45	108	25.4	30.9	56.4	21.7	82.5
Nevada	5	8	27	20.7	26.0	57.9	25.6	122.7
Pacific	**727**	**1,384**	**2,794**	**31.4**	**46.1**	**61.4**	**46.8**	**33.2**
Washington	117	241	448	26.4	44.4	59.0	68.2	32.9
Oregon	99	161	283	35.6	46.8	57.8	31.5	23.5
California	511	982	2,063	32.0	46.5	62.5	45.3	34.4
United States	7,459	14,848	26,304	24.7	40.5	58.2	64.4	43.3

[1] Brief reference is made in the text to some limitations of these data.
[2] 1930 and 1931 only.
[3] Admitted to death registration States in 1933.

rately, by State. For the entire United States, however, there was a much greater percentage increase for nonwhites during both periods, being 98 percent and 62 percent, respectively, for nonwhites as compared with 64 percent and 42 percent for whites.

MacMahon (*8*), who studied the increase in leukemia mortality among the white population of each State between two periods, 1938–42 and 1949–53, was impressed with the large percentage increase exhibited in five of the Mountain States—Nevada, Utah, Arizona, Idaho, and Montana. Three, and possibly four, of these States showed a greater percentage increase in leukemia deaths between 1940 and 1950 than was observed between 1930 and 1940. Inasmuch as the number of deaths on which the increases are based is small; since these States, except Utah, lack University Medical Centers, it is probable that some of their residents died outside the State, with the result that part of their increase in mortality from leukemia after 1940 is an artifact; and since 11 other States not in this region exhibited the same type of trend, we can see no reason to single these States out for particular consideration on the basis of these data.

Mortality Among Physicians

No published data are available in the United States for a fully adequate analysis of leukemia mortality trends among physicians as a whole, or for any physician speciality group. With the exception of the report of Dublin and Spiegelman (*9*), all studies of leukemia mortality among physicians have depended upon leukemia deaths listed in the obituaries published in the Journal of the American Medical Association. Since these do not always give the cause of death, and since all physicians' deaths known to the association are not listed, it has not been possible to compute adequate mortality rates from these data. It has been feasible, nevertheless, to compute age-specific ratios of listed leukemia deaths to all deaths listed among physicians, and to compare them with ratios similarly derived for deaths recorded in the white male population as a whole. This has been accomplished, notably by Henshaw and Hawkins (*10*) and by Peller and Pick (*11*). Both studies yielded higher leukemia ratios among physicians than among the general white male population as a whole.

Ratios of this kind, even when computed on an age-specific basis, do suffer from some uncertainty as to how much of the result reflects an excess of leukemia and how much may be due to a deficit in other causes of death. At the present time, at least, such ratios would somewhat overestimate the rate of leukemia among physicians since Dickinson and Martin (*12*) have shown a deficit of 7 percent in mortality from all causes for this profession during the

Table 6. Average annual leukemia death rates for physicians compared with rates for all white males, United States, 1938–42

Age group (years)	Number of physicians [1]	Leukemia deaths, physicians, 1938–42 [2]	Average annual leukemia death rate per million		Ratio of rates: physicians / white males
			Physicians	White males	
All ages	175, 159	[3] 102	116. 5	[4] 66. 5	1. 75
20–34	42, 471	11	51. 8	18. 3	2. 83
35–44	40, 029	10	50. 0	28. 6	1. 75
45–54	31, 314	18	115. 0	53. 9	2. 13
55–64	31, 352	22	140. 3	102. 1	1. 37
65–74	22, 186	31	279. 5	156. 4	1. 79
75–84	6, 788	9	265. 2	182. 0	1. 46
85 and over	1, 019	1	196. 3	125. 9	1. 56

[1] From Dublin and Spiegelman (*9*).
[2] From Spiegelman, personal communication.
[3] Including 7 females, aged 34, 38, 40, 47, 54, 66, and 71 years.
[4] Adjusted to age distribution of physician population.

Table 7. Average annual leukemia death rates for physicians compared with rates for all white males, United States, 1949–51

Age group (years)	Number of physicians [1]	Leukemia deaths, physicians, 1949–51 [2]	Average annual leukemia death rate per million		Ratio of rates: physicians / white males
			Physicians	White males	
All ages	204, 450	85	[3] 145. 4	[3] 104. 9	1. 39
20–34	50, 566	4	26. 4	24. 3	1. 09
35–44	54, 496	6	36. 7	34. 3	1. 07
45–54	38, 270	7	61. 0	68. 5	. 89
55–64	27, 411	14	170. 2	148. 7	1. 14
65–74	21, 952	32	485. 9	277. 1	1. 75
75–84	10, 256	21	682. 5	389. 1	1. 75
85+	1, 499	1	222. 4	372. 8	. 60

[1] From Dickinson and Martin (*12*).
[2] From Dickinson and Martin, personal communication.
[3] Adjusted to the age distribution of physicians in 1940, as reported by Dublin and Spiegelman (*9*).

years 1949 to 1951. Such ratios would also overestimate the rates of leukemia mortality among physicians if leukemia deaths were more regularly listed in the obituaries than were other causes of death.

Because of the interest in leukemia among physicians, it appears desirable to place on record their death rates and their trend. This is now possible through the courtesy of M. Spiegelman of the Metropolitan Life Insurance Company and Dr. F. G. Dickinson and L. W. Martin of the Bureau of Medical Economic Research of the American Medical Association, who have supplied us with unpublished data. These data are shown in detail in table 6 for the 5-year period centering around 1940 and in table 7 for the 3-year period centering around 1950. Spiegelman identified 102 leukemia deaths (table 6) among physicians between 1938 and 1942. This is 26 percent more than the 81 deaths which Henshaw and Hawkins (*10*) found listed in physicians' obituaries during the same period.

The tables also show rates for the same periods for white males in the United States as a whole, and ratios of the age-specific leukemia mortality rates for physicians to the rates for white males. These ratios decreased with age in 1940, but increased with age in 1950. In 1940 the age-adjusted rate was 75 percent greater for physicians than for white males as a whole, while in 1950 it was only 39 percent greater. This is due to the fact that the rates among physicians increased only 25 percent in 10 years, while those for all white males of the same ages increased 58 percent. Comparison of leukemia mortality rates in tables 6 and 7 also shows that there was a decrease in leukemia mortality in the 10-year period, for physicians under 55 years of age, which was more than offset by increases for those over 55.

Summary and Discussion

Mortality attributed to leukemia in the death registration States of the United States between 1921 and 1955 has been characterized by:

1. An increase in the age-adjusted death rate for all ages, in both races and in each sex, with the rate of increase greater for nonwhites than for whites.

2. A decline since about 1940 in the rate of increase among white persons, but little tendency toward a decline among nonwhites. For the entire population the percent increase dropped from 64 percent between 1930 and 1940 to 43 percent between 1940 and 1950.

3. A regular decline since 1940 in death rates for white infants under 1 year of age.

4. An increase since 1940 in death rates for white children 3 and 4 years of age, which tends to offset the decrease exhibited among infants. For all ages under 5 years, in both

races and in each sex, however, the accumulated probability of dying from leukemia has been relatively stable since 1940, with an apparent tendency to decline among the whites since 1950.

5. A perceptible decline since 1940 in the rate of increase for all other age groups in the white race except for those 75 years of age and over. This tendency is more marked in the younger ages, and its magnitude decreases with age.

6. A smaller percentage increase between 1940 and 1950 than between 1930 and 1940, in two-thirds of the States.

7. A smaller increase between 1940 and 1950 among physicians than among white males of the same ages in the general population.

If these trends among whites persist, they will eventually result in stabilization or actual decline in the leukemia death rates for all ages. Without projection into the future, however, the trends presently evident provide no support whatsoever for a theory which postulates a sharp increase within the last 15 years in leukemogenic factors affecting the environment of Americans in general. On the contrary, the data suggest that such exposure has either become stabilized or has actually decreased during this period, if exposure to environmental factors is in fact responsible for the disease. The steady decrease in rate of increase in leukemia mortality in every age group among the white population under 75 years of age is entirely consistent with a theory of recent decrease in exposure of the general population to whatever causes operate to induce the disease.

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Haldeman Named Division Chief

Dr. Jack C. Haldeman has been appointed chief of the Division of Hospital and Medical Facilities of the Public Health Service. He succeeds Dr. Vane M. Hoge, who has been named executive director of the newly created Hospital Planning Council of Metropolitan Chicago. Dr. Hoge is retiring after 30 years with the Service.

As chief of the division with the rank of Assistant Surgeon General, Dr. Haldeman will administer the Hill-Burton program which, as its executive officer from 1946 to 1948, he helped to organize. In 1948 he became the first director of the Service's Arctic Health Research Center in Anchorage, Alaska, a post which he held until 1951. Subsequently he served as chief of the Division of General Health Services, Bureau of State Services, and for the past year he has been deputy chief of the division that he now heads.

Health economists are concerned with the organization of the market for health services and the net yield of investment in people for health. The "optimum" use of resources for the care of the sick and the promotion of health defines the special field of inquiry.

Toward a Definition of Health Economics

SELMA J. MUSHKIN, Ph.D.

TWO RECENT developments, each traceable to scientific advances in medicine, have focused attention on health economics.

First, new therapeutic products have provided specifics for many infectious diseases that, less than 20 years ago, were important causes of death in the United States and other industrial nations. These changes in medical techniques, which have increased the physician's capacity to deal effectively with diseases, have altered patterns in the organization of health services. Concomitantly, problems associated with the costs of medical care have been intensified and have stimulated prepayment arrangements for meeting these costs.

These changes have also given rise to many questions about the nature of the "market" for health services; about the relation of plant "capacity" (hospital facilities, for example) to use of health services; and about variations in "demand" attributable to prepayment. Especially urgent are questions about shifts in "demand" due to third party payments for limited types of medical care and about effects of alternative methods of payment and compensation on the "price" of health services. These questions are illustrative of the many raised by altered patterns in the organization of health services and altered methods of paying for health care. They comprise one set of economic issues.

A second set of issues arises from another development in medical science: the possibility of increasing life expectancy. Average life expectancy at birth in many of the nations of Asia and Africa—nations which include almost two-thirds of the world population—was until recently about 30 years. This may be contrasted with almost 70 years of life expectancy achieved in the United States. The potential increase in life expectancy sharply focuses problems of balance between population and resources, between work forces and output, in the industrially underdeveloped but densely populated nations of the world. Scientific advances in medicine and public health can be applied quickly and with minimum expenditures to reduce death and morbidity rates in these nations. Spraying with DDT, immunization with BCG, and treatment with penicillin have yielded dramatic results in reduced mortality from malaria, tuberculosis, syphilis, and yaws.

Reduced death rate has intensified a search for answers to specific economic questions so that the achievements in health will not be dissipated by the pressures of increased population on low food supplies, with the consequent intensification of poverty. Some of these questions are related to the means by which the net yield of investment in people for health may

Dr. Mushkin is an economist in the Division of Public Health Methods, Public Health Service, and research associate, Johns Hopkins University School of Hygiene and Public Health.

be measured, the relative amounts of complementary and supporting capital investment and capital growth required, and the effects of changes in health status on productivity. At the same time, the changing monetary value of man, in his productive capacities, effects an impact on economic growth.

These two sets of issues in common require, among other things, an analysis of the optimum use of resources for maintaining and improving the people's health and the quality of the population. Both sets of issues have been pressed by the requirements for policy formulation—public for health issues facing less developed nations, and largely private for health issues arising out of the medical market, at least within the United States.

Administrative Definition

What then is health economics? Generally, "health economics" has been used by health administrators to refer to any investigation that deals with money in its relationship to health. The two medical journals with economics in their titles perhaps give a clue to what those in the health professions consider to be encompassed within the scope of a health economics inquiry. One of these journals, *Medical Economics*, is essentially a business journal for physicians, and regularly features articles on physicians' office methods and finances. Special feature articles in 1957, for example, deal with the physicians' income, hours of practice, specialties, fee determination, voluntary health insurance developments as they bear on the physicians' practice and finances, cost of practice including malpractice insurance, taxation problems such as definitions of business expense, and problems of estate planning.

The second periodical, *Public Health Economics*, published by the Bureau of Public Health Economics of the University of Michigan's School of Public Health, abridges articles and news items. Materials abridged are classified currently in the following manner: legislation, governmental programs in operation (Federal and State), prepayment plans, health personnel, hospital and other health facilities, receipt of care, and developments in other countries. The first issues of this periodical in 1944 published news items on governmental health programs, views of the health professions on the organization and financing of health services, medical education, hospital organization and services, dental health needs and services, voluntary health insurance plans, and public health education. In the foreword to the first issues, Dr. Sinai stated, ". . . this publication is a tangible tribute to . . . contributions toward the development of a new and vital blending of the medical and the social sciences. The blend is public health economics."

Thus "health economics" has been both broadly conceived to encompass the range of social sciences, including public administration, and narrowly conceived to deal with business methods of organization and of payment.

Economic Propositions

What has the professional economist had to say about health economics? Until fairly recently, economists have given little thought to the market organization of health services or to the net economic yield of investment in the health of people. This lack of attention to the medical market may be traced to the special characteristics of medicine that mark it as an exception to economic propositions that explain the mechanisms of the market generally.

There are several important characteristics of the medical market that differentiate it from the market of classical economics. First, the profit motive is not adequate as an explanation of the activity in the medical "market." Hospital care throughout the centuries has been either primarily public or under the auspices of nonprofit institutions. While services of physicians in the United States are organized on as individualistic basis as any profession or enterprise (and it is fair to say, even more so), physicians have accepted their social role in the community and have often cared for the sick and promoted health without remuneration for their time and skill. Also, professional motivation in pursuing the medically interesting case often causes the medical practitioner to evaluate his leisure, income, and work differently from, say, skilled operatives in industry.

Second, in medicine, price is not the sole

means by which demand and supply of medical and health services may be equated. As a social responsibility, private associations, nonprofit in form, and private practitioners have provided necessary services for those unable to pay. And fees for services have been graded in accord with rough evaluations of ability to pay. In the economy generally, however, the price system is the instrument for the allocation of goods among consumers and their competing demands. Government traditionally has been looked upon as an instrument to correct the market mechanism where it fails markedly to satisfy the wants of individuals. In the sphere of medical care, however, individual needs have been met historically, at least in part, by nonprofit organizations and by the practitioner guided by the code of Hippocrates.

Moreover, a competitive price has been generally absent from the medical market, at least until recently. In part, this is attributable to the absence of a homogeneous commodity. Skill and capacity vary with the individual abilities of health personnel, and needs of patients differ, too.

Third, medical services are personal services; money cannot veil the transaction. The cold impersonality of money, so much a part of all other "business" transactions, is largely absent from medical exchanges between those who give services and those who receive them. For a part of what one buys in medical services is a personal relationship.

Fourth, consumers do not choose between health services and other goods and services by means of a simple rational weighing of choices, for (taking consumer health expenditures as a guide) the consumer prefers to avoid, or remove the circumstances that compel, using resources for health purposes. In every income group there is a heavy concentration of expenditures for medical care among those families who suffer illness. This concentration suggests that consumer outlays are undertaken primarily to cure or provide services for the sick. This pattern of consumer preferences may be illustrated in other ways. For example, in any year, only about one-third of the population purchases dental services (*1*). About one-fifth of physician services are for preventive health services; the remaining services are for the cure and diagnosis of disease (*2*). Moreover, data on expenditures and on the relation of expenditure to income suggest that the familial patterns of consumption are distorted when illness strikes.

Efficient organization of economic resources for health, guided by the consumer's preference, depends upon the consumer's knowledge and the extent of his education. Despite persistent efforts to educate consumers they reveal considerable absence of accurate knowledge about the quantity and quality of health services required. The nature of the medical service itself and its intangible character reinforce the consumer's lack of knowledge about his purchases, and impede a rational choice that could guide the allocation of resources.

Furthermore, in an individual's purchase of many medical services, there is a social utility. Purchase of health services for the prevention of contagious and infectious diseases, such as smallpox, poliomyelitis, and whooping cough, provides a utility, or a benefit, for the community as a whole. Even curative health services, such as those for the treatment of tuberculosis or syphilis, help to prevent the spread of the diseases; thus an individual's purchase of services for his own cure benefits his neighbor. These important "extra-buyer benefits," or "external economies" in the prevention of disease, are instances in which individual demand and market price underestimate the marginal and total benefits provided. Preventive health services would be undervalued, underpriced, and underproduced, unless administrative agencies (government or nonprofit) entered the market.

Population and Resources

While economists have devoted little attention to the medical market they have long dealt with population growth in relation to limited physical resources. Malthus' Essay on the Principle of Population, first published in 1798, triggered a series of economic postulates giving a man-against-nature view which earned economics its designation as the dismal science. Most important of these postulates for health programing was the iron law of wages.

Alfred Marshall, whose Principles (written in the decade 1881 to 1890) represents a transi-

tion from classical to modern economics, wrote: ". . . earlier economists argued as though man's character and efficiency were to be regarded as a fixed quantity. . . . [Economics] is getting to pay every year a greater attention to the pliability of human nature, and to the way in which the character of man affects and is affected by the prevalent methods of the production, distribution and consumption of wealth" (*3a*).

Marshall, dealing with the agents of production in book 4 of his Principles, considers not only the growth of the population but the health and strength of the population. Marshall opened a chapter of this book with, "We have next to consider the conditions on which depend health and strength, physical, mental and moral. They are the basis of industrial efficiency, on which the production of material wealth depends; while conversely the chief importance of material wealth lies in the fact that, when wisely used, it increases the health and strength, physical, mental and moral of the human race" (*3b*).

While some few economists have recognized the concept of "personal capital," of personal hazards to workers in industry as "social costs," and of health (physical and mental) as a component of workers' efficiency, by and large these concepts have been qualifications rather than integral parts of their economic propositions.

Three interrelated facets of analysis are essentially involved. Population pressures on resources, constituting one facet, have been dealt with in economic discussions of underdeveloped areas of the world (*4*). The Malthusian theory has gained new importance in this context.

The second facet is the capital value of man. Dublin and Lotka, demographers and actuaries rather than economists, have contributed the major work on the methodology of evaluating the capital represented by man (*5*). For their purpose they define capital value as the present and discounted value of future earning power of the wage earner, reduced by the costs of birth, upbringing, and maintenance during a working life. In their study they traced the thinking on man's capital value through the works of Sir William Petty, Adam Smith, William Farr, Frederick Engel, Alfred Marshall, Irving Fisher, and others. Subsequent studies of special importance to this particular analysis are those made by Wolfbein and Wool for the U. S. Department of Labor on the measurement of a working life (*6*, *7*).

The third facet is the application of cost-benefit ratios to health programs. Work in this area has been traced to the 16th century study of Jean Bodin, to Richard Cantillion's essay on The Nature of Commerce in General published in 1755, and to Quetelet, a social statistician, who wrote in 1835: "In his early years, man lives at the expense of society; he contracts a debt which he must one day discharge; and if he dies before he has succeeded in doing so, his life will have been a burden rather than a benefit to his fellow citizens . . ." (*8*). Economic studies of cost-benefit ratios of health programs have been carried out largely by health administrators and others in the health professions rather than by economists. Hermann M. Biggs expressed the health administrator's concern in his slogan coined more than three and a half decades ago for the New York City Health Department: "Public health is purchasable; within natural limitations a community can determine its own death rate."

Winslow-Myrdal Exchange

Health cost-benefit analysis has gained new significance since World War II, especially in the studies and activities of international organizations. Major contributions to this analysis were made by C.-E. A. Winslow in his 1951 volume on The Cost of Sickness and the Price of Health, by the exchange of views between Winslow and Gunnar Myrdal before the Fifth World Health Assembly of the World Health Organization in 1952, and in the subsequent volume by Myrdal on Economic Theory and Underdeveloped Regions published in 1957.

Differences between Winslow's views and those of Myrdal are largely differences in emphasis. Winslow argued that investment in health promised large dividends in life capital. For in the less-developed areas of the world where there was no surplus to invest in the profitable enterprise of health, the vicious cycle

of poverty and disease pursued its course unchecked. "Men and women were sick because they were poor; they became poorer because they were sick, and sicker because they were poorer" (*9a*). The doctrine that successful health programs will increase the sum of human misery, Winslow said, is founded on the fallacious assumption that there is some basic law limiting economic development to that which has at the moment been realized. He pointed to improvements in agricultural production in the less developed areas of the world, to the development of mineral resources, to other social as well as economic measures improving the well-being of the population, and to the supplementation of these measures by efforts in some countries to limit excessive rates of population increases. He emphasized that the public health programs cannot be planned in a vacuum, but only as a vital part of a broader program of social improvement (*9b*, *10*). He urged health leaders to "keep careful records of the cost of their health programmes and of the actual results attained, and make estimates of the economic gains corresponding to the decreases recorded in mortality and morbidity" (*11*).

Myrdal, starting from Winslow's thesis of a "vicious cycle," elaborates a theory of circular causation. In brief the Myrdal theory is that at one point of time there is accommodation in society between opposing forces. If either of two opposing forces changes, Myrdal writes. a change is bound to occur in the other force, "and start a cumulative process of mutual interaction in which the change in one factor would continuously be supported by the reaction of the other factor and so on in a circular way. . . . The point is not simply that many forces are working in the same direction. They are, in fact, not doing so. In general there are periods when opposing forces balance one another so that the system remains in rest until a push or a pull is applied at one point or another. When the whole system starts moving after such a shock the changes in the forces work in the same direction, which is something different. And this is so because the variables are so interlocked in circular causation that a change in any one induces the others to change in such a way that these secondary changes support the first change, with similar tertiary effects upon the variable first affected, and so on" (*12*). Myrdal notes that if his theory of cumulative causation is valid, an upward movement of the entire system could be caused by pressures applied to one or several points in the system. However, in agreement with Winslow, he argues that rational policy should not induce a change in only one factor, especially with sudden or great force.

Drawing on his theory of cumulative causation, Myrdal argues that it is far from a simple matter to define or to measure the economic value of programs directed to the promotion of a population's health.

Costs and benefits are likely to be different in the short run from what they would be otherwise and to be different in different environments. Long-run values depend on the interrelationship of factors in any given society.

Myrdal emphasized that the success of health programs will depend entirely on whether they are appropriately integrated in a program of general economic development. He thus agreed with Winslow that health programs should "be a vital part of a broader program of social reconstruction."

Myrdal also agreed with Winslow that a health program could increase the number of persons in the productive age groups and their productivity. But, he emphasized, "the economic value of preventing premature death . . . depends entirely upon whether such an economic development is under way which ensures productive work for the greater number of people we thus keep alive" (*13*). If death rates are reduced in areas in which there is already substantial unemployment, poverty could be aggravated. While Myrdal, in common with Winslow, questioned the static notion of a "population optimum," in view of the expandability of production resources, he laid far greater emphasis than Winslow on the need for capital investment in production facilities. The amount of planned capacity required to prevent economic stagnation and increased distress would be enlarged by a truly successful health program.

Myrdal suggested that calculations on the price of health and the cost of illness should be based on something other than a dollar value of people.

Success of a program, for example, might be calculated on savings in life and abilities rather than dollars. Costs of alternative programs, or of their administration alone, might also be compared without reference to the dollar value of people.

The Winslow-Myrdal exchange has served to point up three needs: (*a*) greater precision in defining measurements of the cost of sickness, (*b*) more careful distribution between primary and secondary impacts and effects of health programs, and (*c*) a more careful formulation of assumptions that underlie alternative economic models (static or dynamic) used in estimating the costs of sickness. The exchange, moreover, has served to provide a broad perspective from which to explore the subject matter of health economics.

Health Economics Defined

Tentatively defined, health economics is a field of inquiry whose subject matter is the optimum use of resources for the care of the sick and the promotion of health. Its task is to appraise the efficiency of the organization of health services, and to suggest ways of improving this organization.

Promotion of health patently involves more than services of the health professions. It includes food, housing, recreation, and clothing, but, although they contribute importantly to health and wellness, they must be excluded from the scope of health economic studies. Unless they are excluded, the scope of these studies would encompass all economic activities and the special problems of health economics would receive inadequate treatment. While the scope of health economics may be delimited in this way, account must be taken of the competing uses of scarce resources, the impact of economic levels and economic growth on the status of health, and the need for health services.

The allocation of economic resources is generally determined in the market by the preference of consumers for different types of consumer goods and by the preference of workers for different types of work, leisure, and income. Welfare economists have taken these preferences, as expressed in the market, as the guide to optimum use of resources (*14–16*).

But there are a number of reasons why these preferences are not a wholly reliable guide to optimum use of health resources, even when the word optimum is used in this special sense.

First, the consumer would prefer to avoid illness and the purchase of health services. And, as has already been indicated, there are sizable "extra-buyer benefits" in an individual's purchase of medical services. Others in the community benefit from his purchase. Purchases by some consumers, for example, of influenza vaccination during the recent epidemic prevented further spread of the disease. The value of the medical services to each consumer did not depend upon his consumption of medical services alone but upon decisions of his neighbors as well. Those who made no purchases of influenza vaccine also benefited. Thus, the social value of medical services is far larger than the private marginal value. Individual decisions of a consumer are therefore inadequate as an efficient guide to the optimum allocation of resources for health purposes. For these individual decisions undervalue health services, which results in an underproduction of these services.

Second, some health services do not lend themselves to pricing on the market so that society's preference for them cannot be adequately valued on the market. Air and water pollution control measures, fluoridation of water supplies, and mosquito control are examples of these services. Furthermore, the price system for individual services is not applied in all cases: (*a*) the medically indigent are not excluded from care when they are sick, and (*b*) public safety and health sometimes require direct provision of health services and the removal of the individual from the community. Public hospital services for the mentally ill and for those with tuberculosis are illustrative of services placed outside the price-market system.

Third, the allocation of health resources is determined by a mixture of private market decisions and administrative decisions. "Administrative decisions" include those decisions made by the government, private nonprofit agencies, and professional organizations. Decisions concerning some health facilities (the building and size of a general hospital, for example) are

made by voluntary agencies. The Visiting Nurse Association determines the availability of part-time nursing care in many communities. In some places the content and quality of rural health services are determined by the regional organizations associated with medical schools. The principles underlying these administrative decisions and the way in which they influence the allocation of health resources need to be explored.

It may be that the principles underlying public budget decisions are applicable to administrative decisions of voluntary health agencies as well as public agencies. While economists have largely neglected theories of public expenditure in favor of theories of taxation and policy, analysis of governmental budgeting has begun. The Joint Economic Committee of Congress, by its 1957 study of Federal expenditure policy for economic growth and stability, has stimulated the development of principles for determining public budget (*17*, *18*). Review of the work is needed to assess its contribution to our understanding of the optimum allocation of economic resources for health.

Consumer preferences as expressed in the market are one guide to optimum use, even though an incomplete guide. Another thing to look at is the effect of health programs on labor resources and production. Gains in output as a consequence of health services may equal or exceed (in a given period of time) the resources used for health. The number and quality of new manpower resources must be compared with the health manpower used in the provision of services. For example, it would be possible to compare the amount of manpower used in providing health services in the United States with gains in labor force participation resulting from reduced death rates. Reduced death rates in the United States have resulted in a decline in separations from the labor force at all ages up to age 65. Despite the marked delay in entry into the labor force by young people, and the earlier exit from the labor force by those in the older age groups, the male worker today puts in many more years of work than did his counterpart 50 years ago (*19*). The problems of cost-benefit measurement have been mentioned in the discussion of the Winslow-Myrdal exchange. The concepts and methods of measurement require extensive further study. Not potential but actual increases in production under prevailing conditions of employment must be measured against the cost of health services in order to determine their relationship to the economic optimum.

One additional aspect of the problem may be mentioned. The economic optimum bears some relation to the amount of health resources required to provide care for all the illnesses in the population. The optimum may be below or above the amount of health services suggested by professional standards. Standards of health resource requirements are familiar to the health practitioners. Professional planning for health services and setting standards are characteristics of the health field. Standards of professional education, requirements for entrance into the health professions, hospital standards, and even in some instances standards of care are determined by professional groups. Moreover, government, by compulsory measures, has enforced standards of public health. For example, vaccination is required as a condition for admission to school, and standards are set for the distribution of milk, for food handlers, and for water supplies.

The National Health Survey is designed to provide data on sickness in the population. In discussing the potential uses of data from such a survey the U. S. National Committee on Vital and Health Statistics indicated that quantitative information would provide a basis for sound evaluations of health facilities, personnel, and programs as well as for a determination of how available resources should be divided among programs (*20*). In an earlier study, Lee and Jones related sickness in the population to the needed volume of health services and manpower requirements (*21*).

The subject matter of health economics includes factors that determine price patterns for health services, ways in which the materials, goods, health manpower, and facilities are brought together at the right time and place and in the right proportions to provide health services, and ways in which the different health goods and services are coordinated. The mechanisms by which goods and services are coordinated are "trade" in the market by the consumer's purchases of health goods and services,

professional codes of performance, and governmental and voluntary agency planning and budget decisions.

Health economics also includes in its subject matter the effects of health services on the size, character, and efficiency of the work force and population. It seeks to gain an understanding of the interaction of levels of living, production, and physical and mental wellness. The health factors which make for work absence, for retirement from work, for labor turnover, for the quality of performance on the job, and for job satisfaction fall within the scope and concern of health economics. The general topics which need to be considered in a comprehensive treatment of the economics of health include the interaction of health services and gross national output, population growth and economic development, and productivity of labor forces; health problems associated with industrial development; the supply of health services; utilization of services and their pricing; and financing of public and nonprofit agency programs.

The scope of inquiry included in the tentative definition of health economics is by no means novel. It is suggested by the work that is going forward in the bureau of medical economics of the American Medical Association, and the bureau of economic research and statistics of the American Dental Association. These organizations have explored the interaction of use and price of health services, health manpower, and facilities and consumer demand. The studies of Eli Ginzberg, Herbert Klarman, and others have increased our understanding of the economics of the hospital system (*22*). Ginzberg's work has also included an examination of the special economic problems of health manpower and methods of providing care (*23*, *24*). And an increasing number of doctoral dissertations in economics have been concerned with these, or similar problems.

Summary

The health administrator has usually equated "health economics" with "money questions in the field of health." But, money is not the central problem of health economics. Health economics is concerned with the optimum use of scarce economic resources for the care of the sick and the promotion of health, taking into account competing uses of these resources. The basic problems are of two kinds: the organization of the medical market, and the net yield of investment in people for health.

Consumer preferences are not an adequate guide to the optimum allocation of resources for health. There are a number of reasons why this is so. For one thing, a consumer would prefer to avoid the illnesses which require use of resources for health purposes. For another, his neighbors benefit from the medical services he purchases, for example, "flu shots" during the recent influenza epidemic. Individual decisions undervalue health services, and would result in underproduction of these services unless supplemented by actions of private voluntary agencies and government.

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Report of International Association of Gerontology

A conference of the European section of the Social Science Research Committee, International Association of Gerontology, held in Copenhagen, Denmark, in October 1956, discussed pensions, assistance, and levels of living, work and retirement, and family and institutional care. The conference recommended that, for purposes of comparison, data be collected in various countries on old people living alone or with relatives, those living in institutions and nonprivate households such as hotels, those who have surviving children, and those who are bedridden, housebound, or limited in movement.

Speakers from the United Kingdom, Italy, Denmark, and the Netherlands described and discussed surveys of income, budgets, living conditions, family relationships, pensions and retirement, research on employment, causes of institutionalization, costs of institutional versus home care, and sociomedical surveys.

The proceedings, entitled "The Need for Cross-National Surveys of Old Age," are available from the Division of Gerontology, University of Michigan, 1510 Rackham Building, Ann Arbor, Mich.

Signs and Symptoms

With this issue, a new department, Signs and Symptoms, is opened. Its main purpose is to provide a setting for what Dr. Joseph W. Mountin once called gems of public health practice. In addition to rare gems, it will give brief notice to other events or activities presumably of interest to readers. The doings of local and State health organizations will be the prime, but not the exclusive, focus of this department, especially if they indicate an important trend or some outstanding development or achievement. Contributions are welcomed.

Directory of Services

A directory describing all services in Greater Cleveland, Ohio, for care of the chronically ill has been published recently by the Cleveland Academy of Medicine and the Welfare Federation of Cleveland.

Intended as a reference for doctors and staff members of health and welfare agencies, the 118-page book lists about 200 different agencies.

In addition to medical facilities, the services described include nursing and rehabilitative, educational, financial, and casework assistance. Special sections deal with the treatment of chronically ill children, older persons, and veterans.

Information about each agency includes: services, eligibility requirements, area served, fees, hours, and referral procedures.

The directory has been distributed to some 2,800 doctors in the Cleveland area.

Traveling Clinic

Rural arthritic victims in Westchester County, N. Y., are being treated in their homes by therapists. The New York State Chapter of the Arthritis and Rheumatism Foundation sends therapists to patients unable to leave their homes or unable to travel to distant clinics.

The patients' private physicians approved the program and consultation with them has resulted in the training of visiting nurses in rehabilitation and the enlistment of help from social workers, nutritionists, and others.

By the beginning of June 1958, nearly 100 patients had been visited and 38 cases had been closed.

Pay for Patients

In a pilot program 25 mental patients have been working for pay at the New York State hospital in Central Islip.

Patients work at small handcrafts or such simple tasks as sewing buttons on cards.

Dr. Francis J. O'Neill, director of the hospital, reports that the patients are not approaching financial independence, but he feels the work advances rehabilitation.

Keeping Current

Responsibility for keeping current with public health literature is managed by the Saanich and South Vancouver Island Health Unit, Victoria, British Columbia, by giving each staff member an opportunity to report at a regular meeting on reading he has done.

H. George Henderson-Watts, senior sanitary inspector, reports that staff members give the title, author, and source; a brief statement of the author's purpose; a comment on the noteworthy aspects of the paper; and the conclusions of the author and reviewer, if any. The paper itself is not read to the staff as a rule: the purpose of the review is simply to inform the staff and to encourage reading in pertinent fields. Reviews ordinarily are limited to 5–10 minutes. Time is also allowed for questions and discussions.

Periodicals, bulletins, and magazines are assigned on a 6-month or yearly basis.

Staff members are encouraged to read in detail the papers they review, to mark important points, and to read them a second time before offering their review.

Home Safety

The final report of the California Home Safety Project covering the years 1953–57 has been issued by the California Department of Public Health. The 165-page report reviews the home accident problem in California and outlines a program of State and local health department activities. It emphasizes the epidemiological approach to accident prevention. Distribution of the report is limited.

Hearing Tests

Audiometric tests for parents help them to understand corrective therapy and sound range limitations of children with hearing losses, the Alaska Department of Health reports.

The tests, offered during National Hearing Month in May 1958, were available to 5 communities; 196 adults were tested.

Glaucoma

In the summer of 1957 funds from the Public Health Service enabled the District of Columbia to begin examining residents over age 40 for glaucoma provided they were not under care of an eye doctor. By the end of May 1958, 3,866 patients had been examined and 27 cases of glaucoma verified. An additional 238 patients were under observation.

CONFERENCE REPORT

URBAN GROWTH

- POLICY
- PLAN
- PROCESS

ON MARCH 18–20, 1958, the National Health Forum of the National Health Council, sponsored by 63 member associations, was held in Philadelphia in conjunction with the 10th annual meeting of the National Advisory Committee on Local Health Departments.

The meetings dealt primarily with stresses produced by increasing urbanization; the financial and organizational implications of metropolitan growth; the effects and predictable eventualities facing local health departments, the dental and nursing professions, and hospitals; and the need to revise obsolete or anachronistic jurisdictions.

Comments of 15 of the 60 speakers at the forum follow. Their full identification appears on page 796.

Major Threads

In his summary, Wolman said the forum "took up the plight of 100 million in a world not made for them." He commiserated with those speakers who were distressed "by the existence of emotions, feelings, and action contrary to the prevailing mode of professional thought." And he offered philosophical solace as he described three major threads in the fabric of the discussion.

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The functions or necessities of urban life have outstripped prevailing government structure and finance. Wolman reminded his audience that this condition was historically true of the core city even before the rise of the suburbs. He said he was in a state of chronic wonder that the core city provides a hundred services as well as it does. It cannot function in theory, but it works. Bread is delivered. Traffic moves. Milk appears on the doorstep. But even so, he emphasized, the core city had frustrations before it sprawled.

People are suspicious of planners. Wolman observed that planners who conceive on a broad scale are impatient with the failure of democracy implicit in the slowness of people to recognize their views and to behave accordingly. But, he suggested, the planner is no free orbiting sputnik; he must move in a stream of human behavior and behave accordingly, "to his intense regret."

Progress is fitful in health, urban government, hospital management. Wolman ventured that events move in obedience to quantum mechanics, in bunches rather than in a smooth continuum. He also observed that progress is geological rather than chronological, that it takes two decades for an idea to bear fruit. This law, he said, is as firm as the biological period of gestation. "Most solutions are ad hoc improvisations, which the planner calls concessions to expedience. As the issues are dramatized, the solutions become concessions to human behavior."

He added that concessions to political expediency are inevitable in human society and that criticism of the politician too often is emotional rather than scientific. He advised that the politician is not to be shunned "as a bearer of contagion." To work with him, he said, is to gain his knowledge of human processes coupled with professional information, and to learn that the education of the public is not to be gained by ex cathedra professional pronouncements, not even with respect to fluoridation.

He thought it unfortunate that the scientist, having gained some knowledge of the atom, is led to the assumption that he knows everything, because his public and political influence suffers thereby. He recalled that Einstein, asked why men can diagnose the atom and yet fail to understand politics, answered, "Politics are more difficult than physics."

The total theme of the forum, he concluded, is that growth creates problems. In their specific aspects, these manifestations of growth appeared to him as:

- Countywide planning, illustrated by Cleveland's hospital service.
- Citizen participation, illustrated by events reported in Philadelphia.
- Responsibility to displaced populations, exemplified in the Eastwick hearing in Philadelphia and events in New Haven, Conn., and Nashville, Tenn.
- Consultation among planners, exemplified by the forum itself.
- Efforts to provide the entire metropolitan area with services usually found ordinarily only

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ABEL WOLMAN, DR. ENG., *chairman, 1958 National Health Forum Committee*

HON. FRANK C. MOORE, *president, Government Affairs Foundation, and co-chairman, 1958 National Health Forum Committee*

NORRIS C. ANDREWS, *planning director, New Haven City Plan Commission, Conn.*

ARTHUR W. BROMAGE, PH.D., *professor of political science, University of Michigan*

ORVIN W. CAMPBELL, *county manager, Miami-Dade County, Fla.*

ROBERT C. COOK, *director, Population Reference Bureau*

JOHN B. DIBELER, *director of education, American Cancer Society, Philadelphia Chapter*

RUDOLPH H. FREDERICH, D.D.S., *secretary, Council on Dental Health, American Dental Association*

LUTHER GULICK, PH.D., *president, Institute of Public Administration*

JACK HALDEMAN, M.D., *chief, Division of Hospital and Medical Facilities, Bureau of Medical Services, Public Health Service*

REGINALD R. ISAACS, *chairman, Department of City and Regional Planning, Harvard University*

MRS. LUCILE PETRY LEONE, *chief nurse officer, Public Health Service*

HON. ROBERT B. MEYNER, *Governor of New Jersey*

SEWALL MILLIKEN, *assistant professor, department of public health, Yale University*

DAVID E. PRICE, M.D., *chief, Bureau of State Services, Public Health Service*

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in the core city, a challenge to health agencies to make greater use of thruways and telephones, which he said are too little appreciated as great public health contributions.

• Research in planning, which he said "too often takes a turn in seeking how to curb those who persist in misunderstanding us."

He did not attempt to review all the major aspects of urban growth, but stressed Luther Gulick's admonition to recognize that the metropolitan area exists, to stop describing it and accept it as a form of behavior or misbehavior, and to revive the concept of community, with its implications for both individuals and the mass.

In conclusion, he said the fiscal basis for the urban complex needs much further consideration. He ended with, "Let us try to facilitate the transition and minimize the hurt."

Demographic Considerations

Speakers generally grasped the concept that growth of cities and populations poses a challenge of management or limitation. As a matter of policy, Isaacs declared that preoccupation with the welfare of random individuals and families was distracting attention from the common good. To illustrate public inconsistency, he observed that while health services reduce death rates, contributing to net population growth, the powers of the gods to destroy whole populations rest in the hands of a few, with the avowed objective of securing the redemption or well-being of every individual.

He predicted that "rigid governmental, economic, and social controls beyond any that we have known will be required" to protect the community interest, and that major mental stresses would result from "the reversal of almost unlimited freedom of action to strong community controls." While he conceded that regional confederation or cooperation might manage most metropolitan needs of the present, he said that in reality we have not been able to establish such instruments of government for more than a fraction of our population, and he asked, "Will we be able to solve the problems of 230 million in 20 years, or 330 million in 50 years?"

Price and others observed that the population was not only growing but moving in a pattern which outmodes established structures of government.

Descriptions of this movement were offered by Cook, Moore, and Gulick. The world's population, Cook observed, is increasing by 45 million a year, 125,000 a day. The world over, too, there is a relentless movement of rural populations to urban communities. Once there, the people do not remain static. In the United States in recent years, more than 30 million people have moved each year at least from one house to another; 10 million moved to a different county.

Moore observed that there are now 174 metropolitan areas in the Nation, and by 1970 there will probably be 10 or 20 others. These areas contain almost 100 million people at present; by 1975 it is estimated that two-thirds of the American population will reside in such areas. Thirty percent of the Nation's inhabitants now reside in the 14 metropolitan areas having more than 1 million people.

Gulick pointed out that there is now a 600-mile linear city of 29 million people on the east coast. From San Francisco south, on the west coast, there is a similar development.

Characteristic of this development, Gulick said, "is a fluidity of population and economic life. This flow changes the basic structure of family, community, social relations, employment choices, shopping, education, communication, and political associations. The new metropolitanism profoundly disturbs most of our social institutions such as churches, clubs, societies, voluntary hospitals and charities, cultural and recreational establishments, political parties, and governmental operations."

The new metropolitan community is different from what we have known generally in the past. "It is a split-level creature," Gulick commented, "with personal human relations at one level, and broad, impersonal community consciousness at the other. And most people live in both levels."

Effect on Health Services

In the face of such growth, Haldeman observed that within the past 5 years there has been little progress in revising or extending

traditional local health services. One-fourth of the counties in the United States, with nearly 10 percent of the population, are still without organized local health services. Therefore, he put these questions:

Is the local health department an effective instrument for some areas but not others?

Are there circumstances so unique in the areas still without a local health department that some entirely different mechanism for the delivery of public health services will be required? If so, what should it be?

Are other community resources already providing, in an acceptable manner, the services ordinarily supplied or arranged for by the health department?

What kind of studies should be undertaken to supply the missing links in our information?

Concern with patterns of health services for the near future is not confined to counties presently without local health departments, he added. Many, many more have only fragmentary service that in no sense meets the health needs of today.

Because of limitations in staff and financial resources, the coverage of service is thin in

Canons of Aesthetics

Some noted American planners and architects appear to me to be on the wrong track. They are so enamored of old cities that they even like "quaint" slums and can see nothing but ugliness in any modern city. So hostile to any apartment are they that they criticize any high-rise multiple dwelling; and so in love with the open land that they want nothing but cottages scattered through the countryside. All such canons of aesthetic value and beauty have the total weakness of ignoring not only relativity and the influence of the total environment, but of flying in the face of human need, denying satisfying classical illustrations, and failing to give any sanction to functional beauty.

The British *Architectural Review* group starts quite differently with the "stratified environment," that is, with relativity, and seeks the canons of beauty first by finding for each defined major type, or stratum, of land settlement its appropriate style of development and the appurtenances which will give it "unity." As they say in the December 1956 issue, "There is a 'town' way and a 'country' way and a 'wild' way of doing everything, and to confuse them is to ruin any hope of integrity from the beginning." It is this unity and integrity, type for type, which they find aesthetically right.

On the basis of British land uses and needs, they then classify all of England into five divisions, or types, for practical purposes: wild, country, arcadia, town, and metropolis; with two added special divisions, rural industry and major roadways.

For each of these types of land use these British architects and planners then seek the appropriate "way" and design, "cutting out useless verticals." The third step is to fit everything together with the minimum waste of space, a principle of economy for each type. Then finally, they say, "the residue must be camouflaged, and made one with the surrounding landscape."

With this approach, one can see why the same high building or solidly paved square will be beautiful in a city, but ugly in a rural setting; why even advertising signs may not be offensive in a business district; why large "natural" open spaces are no addition to a city center; and why a Cotswold cottage may be beautiful in the country, but absurd as a comfort station in a city park.

On the aesthetic side, it seems to me, the British, and a few American architects, like Neutra and Walker, have found the answer to the question, "What's so 'bad' about urban sprawl?" The thing that is "bad," is that in the "sprawl" regions we are mixing several incompatible types of land development, thus finding ourselves, without confinement, in a series of conflicting and unreconcilable categories each of which should be subject to its own appropriate canons of beauty.

—LUTHER GULICK, *president, Institute of Public Administration, in an address to the American Association for the Advancement of Science, December 27, 1957.*

some areas, and growing thinner each year as the population most in need of health services (the very young and very old) increases.

Staffing and financing of local health services are considerably more difficult in health departments serving populations of under 100,000 than in large cities.

In such places, either additional staff and funds, or a major realinement of duties of personnel presently employed, or a change in the basic role of the health department is needed, he said. "Which—or which combination—shall it be?" he asked. "What more functional areas can be defined as a suitable geographic base for health services?"

Jurisdictional Autonomy

Several speakers observed that the main difficulty in pursuing a governmental solution to the intensified needs of metropolitan residents is to see that federation does not in any way infringe upon the identities of existing local units. Stepping up State action, Bromage suggested, is the quickest means of making metropolitan government possible. "Metropolitan councils arising out of interstate compact and crossing State boundaries," he said, "are not beyond the realm of possibility."

One means of effective compromise was suggested by Moore: a metropolitan council that would be assigned only metropolitan matters. The local units would be responsible for their normal, nonmetropolitan activities, as in the Toronto plan.

"The first step towards determining the form of government required to meet our needs," Moore said, "is to define the kind of urban community we want." The decision on this matter, he feels, is primarily a local one. It must be appraised on the basis of the probable effects of the dispersal of industry, automation, nuclear energy, wider distribution of natural gas and oil, Federal highways, changes in marketing and distributing, standards of living, and longevity. "There is no need," he cautioned, "to seek uniformity in the forms and patterns of government in all great urban areas; diversity is still desirable."

Past attempts to solve metropolitan problems, Moore argued, have usually been directed not against the total need but to some fragment of special interest. Such efforts have generally failed to produce important results. Piecemeal attacks, moreover, have frequently resulted in the creation of public authorities and special districts. If pursued generally, he said, "this could be the route to destruction of local government and popular control as we know it."

Dibeler considered decentralization of health agency operations through the development of volunteer neighborhood organizations a means of providing solutions for some of the health problems created by urban sprawl.

The newly burgeoning communities, Dibeler pointed out, lack solidarity and suffer from absentee leadership, since many of the residents are employed in nearby cities, making it difficult for anyone to organize them into a health-conscious community.

The city health officer is in no less of a predicament. Neighborhoods catering to one class of people, structured according to a relatively stable age-sex pattern, explode and disappear. In their place is another group of people. "The problems of providing health services and health education here," Dibeler said, "are increased by the introduction of new groups whose culture is not well understood and among whom there is often little identifiable leadership. Problems of communication are increased by language barriers and varying culture."

Local Solutions

In combating the effects produced by outmoded institutions several governments, on different levels, have initiated or contemplated means of developing new methods and new institutions.

In New Haven, Conn., a regional planning organization was formed in 1948 to bring the surrounding communities closer together in function and direction. Andrews referred to the redevelopment project of the Yale University School of Medicine and its department of public health as one outcome of regional planning. Located in the first area selected for clearance and rehabilitation, the project covers 150 acres of land. Additional projects, now in

the Federal review or planning stage, are integral parts of a renewal and rehabilitation program. At the same time, the planning organization is developing plans for the protection of sound residential areas which will involve extensive housing inspection and neighborhood studies to insure that environmental conditions adversely affecting the neighborhoods do not develop. "The New Haven program," Andrews observed, "is the result of a combination of strong leadership, active citizen participation, and soundly conceived technical assistance."

In 1957, the Miami-Dade County complex adopted a charter that, according to Campbell, "for the first time in America established a legal entity designed to handle the entire metropolitan situation through an agency given full responsibility for control of local affairs."

"Where we confront problems that defy boundary lines," Governor Meyner said, "we can develop regional cooperation. And this can be done in health services as it has been done in public education."

Governor Meyner pointed out specific problems that can be best handled through cooperative efforts of different levels of government.

Septic Tank Suburbia

We seem to be on the way to creating a septic tank suburban civilization—a maze of septic tank suburbias. We are doing this because we are now repeating, at least in principle, the mistakes which we formerly permitted in our cities and which we are now spending billions of dollars to correct.

What is happening is, of course, a part of a great transformation—call it explosion—that is taking place in our living patterns.

Because our cities grew painlessly and, in any case, were unfit to handle our automobile way of life, people have been beating it out to the country. At least it once was the countryside. It isn't anymore. The green fields and the old swimming pond have been replaced by hotdog stands, filling stations, superhighways, highway intersections, airports, outdoor movies, indoor skating rinks, and shopping centers. These things have their place, but usually they are in the wrong place.

There isn't a plan, or what plans there are aren't being implemented in relation to the whole. So a few years from now we will be faced with demands for the expenditure of more dollars to straighten out the mess. And when I say "we" I mean the taxpayers.

No one can say we haven't been warned. And no one will be able to blame Uncle Sam. Uncle Sam isn't in any position to police an expanding (or exploding) metropolitan area any more than he can exercise police or zoning powers in a municipality. And no one wants him to.

What Uncle Sam can do (and has been doing), however, is to fly a warning flag about the growth of septic tank civilization and relate it to the larger problem: the grave need for planning on a metropolitan scale and for action to follow that planning.

The blunt truth is that without effective planning most human enterprises go bankrupt.

One of the tools available to us is the urban planning assistance program, otherwise known as section 701 of the Housing Act of 1954.

Section 701, among other things, authorizes Federal financial aid on a matching basis to official State, metropolitan, or regional planning agencies for the planning of metropolitan and other urban regions.

Some 40 areas are now participating. Others are applying. However, the resources available to section 701 stretch only so far; what I say on this score must not be taken as an open invitation.

What I want to underscore is that planning by itself, no matter on how big a scale, is not enough. Plans may be wonderful; they can be supported by bales of statistics and illustrated maps and charts. But something more is necessary to give them meaning.

The plans must be acted on, and the primary responsibility for this lies with the citizens of the regions involved. To put it in the bluntest terms, the money they save will be their own.

—ALBERT M. COLE, *U. S. Housing Administrator, excerpts from an address to the annual meeting of the Prefabricated Home Manufacturers' Institute, Boca Raton, Fla., March 19, 1958.*

Family care programs, community mental health services, and stream pollution control are matters for cooperation among neighboring municipalities and for action at the county level of government. On the interstate level, water and air pollution problems may be solved. At the present time, New York, Connecticut, and New Jersey have an Interstate Sanitation Commission for the control of water pollution affecting those States. On the Federal level of government, or Federal-State level, are such matters as hospital construction and the control of epidemics. The recent efforts in the Asian influenza epidemic and the Hill-Burton Act are evidence for this kind of cooperation.

"There are relatively few eventualities that do not engage the attention of more than one isolated agency," the Governor said. As an example, he showed how six State departments participated in the establishment of a program for New Jersey's senior citizens. The agencies concerned were: the New Jersey Department of Health (chronic illness and needs of the aging); Department of Institutions and Agencies (public assistance, institutional care, and hospital and nursing home supervision); Department of Labor (employment service and rehabilitation); Department of Education (adult education); Department of Conservation and Economic Development (recreation and housing); and the State Treasury (pensions and other financial needs).

Effects on Nursing

Leone reported on trends of staffing hospitals with nurses as urban centers expand. In 388 small communities that built new hospitals between 1947 and 1954, 2 out of every 5 professional nurses employed there came out of retirement. Many other nurses, Leone said, who had been working on other locations came back to live in their own hometowns when the new employment opportunities developed.

The turnover of nurses in suburban hospitals is somewhat less than in urban centers, she said. While the first problem of suburban hospitals is to recruit nurses, once they are recruited they tend to stay in their jobs longer than nurses employed in downtown hospitals. In getting to their jobs, they prefer not to travel through a downtown area each day to a suburb.

In a study of 1 suburban hospital in Arlington, Va., 2 in Maryland, and the new Washington Hospital Center in the District of Columbia, Leone found that only in Arlington was there a shortage of nurses. "Factors exerting a favorable influence on the acquisition of nurses," Leone said, "were (*a*) pay increase, (*b*) aggressive campaign for nurses, (*c*) newness of hospital and availability of parking space, and (*d*) need of married nurses to supplement their husbands' incomes. Unfavorable factors were (*a*) poor location with regard to bus service, (*b*) lack of school of nursing in the hospital, and (*c*) low pay."

In order to give adequate service to the mushrooming population, the Arlington Hospital, with its shortage of nurses, makes use of trained aides, clerks, and volunteers.

Effects on Dentistry

Frederich, citing the 1956 survey of dental practice conducted by the bureau of economic research and statistics of the American Dental Association, pointed out that dental care is significantly more available in the suburban business area than in other areas. The urban downtown area follows close behind and slightly ahead of the urban neighborhood area, and the suburban and urban residential areas drop off markedly in availability of dental care.

What are the factors influencing this distribution of dentists? "Established practitioners," Frederich said, "are reluctant to relocate their practices until the inconvenience of their location to patients who have moved away is reflected in pressures from those patients. The choice of a new location is then made between the outlying suburban business district (or neighborhood business district) and the downtown area of the city. The dentist's decision will depend on whether he will follow the family practice into localities where his patients have moved or whether he will make himself convenient to the wage earner who prefers to obtain his dental care near his business location."

"The younger dentists," Frederich said, "tend to locate their practices in newer but established surburban areas which have a higher child

population and a higher level of dental health education than other areas. The dentist is thus able to establish himself more quickly and develop a stable family dental practice, convenient to a highly desirable living environment for his family and himself."

The trends in distribution of dental specialists, he said, are consistent with the distribution of general practitioners. Orthodontists have shown a decided preference for localities with large populations of children and accessibility to good transportation. Frequency of visits and relatively short appointments are not compatible with difficulty of access to the office or inconvenience in transportation.

Oral surgeons tend to occupy central locations with easy access to large numbers of people. They also consider the accessibility of hospitals for the management of the more serious problems.

In the newer trends of distribution of dental services, Frederich observed, there are specific ramifications for those who purchase dental care through personal budget payments (purchase is made through a credit agency) and group purchase plans, and for the indigent.

The budget payment plans, which operate best through centralized administration of its professional and economic aspects, are faced with certain problems imposed by a sprawling population over a wide geographic area, sometimes reaching over State lines.

"As group purchase plans develop and expand, it is reasonable to anticipate that dentists will be attracted to the areas where people covered by such plans live. For access to these plans tends to raise the dental health education of their members and increases their desire to avail themselves of dental care," he said.

The most serious problem that can be expected to develop, according to Frederich, will be in the operation of public assistance welfare programs for dental care. It is reasonable to assume that the suburban shift contains a high percentage of the self-sustaining population, thus resulting in a concentration of lower income and indigent population in the urban area.

If the trend toward the centralization of dental practices in suburban business centers, urban downtown, and neighborhood business areas continues, there will be fewer dentists available to meet the needs of an expected expanding public assistance welfare health program. To compound this difficulty are the general lack of funds to support the costs of such programs of dental care, particularly for children, and the relatively low level of dental health education of the group. If these conditions are reversed, it seems reasonable to predict that dentists will locate their practices where the demand for care exists, he said.

The changing distribution of population will also have an effect on the special problems of providing dental care to special disease groups. "Certainly," Frederich concluded, "the expansion of the concept of the hospital as a community health center, where all aspects of health care are made available, will have an effect on dental practice."

Conclusion

In 20 short years, Price said, the health of three-fourths of the entire population of the United States will depend upon how well we manage metropolitan services. What kind of air will we be breathing in 1980? he asked. What kind of water will we drink? We are already finding it hard to produce the 200 billion gallons of acceptable water which farms, industries, and cities require daily, he said. How are we going to provide 350 billion gallons a day by 1975?

From now on, Gulick said, most Americans will be born, grow up, live, work, and die in great metropolitan complexes. From now on we are an urbanized community. And something more than the expansion or adumbration of present facilities is needed, he observed. "Improved and expanded water supplies and sewer lines, wider streets, or better housing are excellent ideas, but," Gulick pointed out, "the real things we need are brains, character, drive, organization, and leadership."

Only leadership, Milliken agreed, can reach across the lines of jurisdictions and assist in bringing about cooperative action.

To these remarks, Price added: "Imagination, creativity, minds that can cut through the cobwebs of long-established procedure and find the new method that does the job faster and cheaper—these are the keys to public health progress."

Mortality in the 1957–58 Influenza Epidemic

CARL C. DAUER, M.D.

OUTBREAKS of A-prime influenza had scarcely subsided in the United States and Europe late in the spring of 1957 when it was reported that an epidemic of influenza had broken out in Hong Kong about the first part of April. Confirmation that a new strain of type A influenza virus, now referred to as the "Asian" strain, was causing the disease was obtained by the third week of May. The disease was reported to be mild and to have a low mortality, although reports from Manila indicated that the number of deaths from all causes was higher than usual in that city.

Introduction of the new strain of virus into the United States from the Far East probably took place by the last of May 1957, and the first outbreak identified as due to "Asian" influenza began early in June in Newport, R. I. During the summer, the disease in the United States was characterized by a series of localized epidemics, some of them interrelated, in closed groups of teen-age children and young adults. Undoubtedly, dispersal of members of some affected groups to various parts of the country served to seed the population extensively before the end of the summer. During this period, deaths attributed to influenza were few, and the mortality rate from influenza and pneumonia was not higher than expected.

One communitywide epidemic of influenza occurred in Louisiana late in August. In September, when schools in most parts of the country opened, explosive epidemics began first in high schools and colleges and immediately thereafter in elementary school populations and in preschool children. Incidence in adults was not excessively high. The peak of the epidemic was reached in the third week of October, after which incidence declined throughout November and December. During January, February, and March, the occurrence of influenza was characterized by numerous localized outbreaks, principally in school and other institutional populations.

During the height of the epidemic in October, respiratory disease rates as estimated by the U. S. National Health Survey were about 111 per 1,000 persons per week in the age group 5 to 19 years, 28 per 1,000 under 5 years, 16 per 1,000 in the group aged 20 to 64 years, and about 9 per 1,000 in persons 65 years of age and over.

Data from two sources show the effect of the influenza epidemic on mortality: the numbers of deaths credited to influenza and pneumonia in 108 large cities, reported weekly to the National Office of Vital Statistics, Public Health Service; and the Current Mortality Sample, consisting of a 10 percent sample of all death certificates filed in State departments of health, copies of which are sent each month to the National Office of Vital Statistics (*1*, *2*). These data are provisional; final figures will be available in early 1959.

Influenza and Pneumonia Deaths in 108 Cities

Influenza and pneumonia deaths reported each week from September 1 to March 29 are shown in figure 1 with the 3-year median fig-

Dr. Dauer is medical adviser in the National Office of Vital Statistics of the Public Health Service. *Assistance in preparing this report was given by Anne E. Sebastian and Sylvia Osato of the Office's Mortality Analysis Section.*

ures for 1954–56. These data show that mortality rose well above expected figures and reached a peak early in November, receding in December and early January 1958 to a level which remained above normal expectancy in December and early January. Another rise in mortality began about the middle of January; it reached a peak about the first of March.

There was a remarkable similarity in the trends of mortality from influenza and pneumonia in the 108 cities of the United States and the 160 large towns of England and Wales as reported in the Weekly Influenza Statement issued by the British Ministry of Health (fig. 1). In both countries, there were two peaks of mortality, but the early peak in the United States was reached 4 weeks later than in Great Britain. If the data are plotted so that the early peaks in each country are superimposed, the similarities are even more striking. Each group, for example, reached a peak in 6 weeks and declined for a similar period of time. Mortality, however, continued to rise for a longer period during the second rise in the United States.

A total of 14,470 deaths from bronchitis was also reported in England and Wales from the first of September 1957 to March 8, 1958. Whether these correspond to any of the bronchopneumonia deaths reported in the United States or some other entity is not known. There were many more such deaths in England and Wales during the second rise of mortality than from influenza and pneumonia.

The estimated numbers of new cases of upper respiratory illness reported by the U. S. Na-

Figure 1. Numbers of deaths from influenza and pneumonia reported weekly in 108 large cities in the United States and 160 large towns in England and Wales, with the median for the period 1954 through 1956.

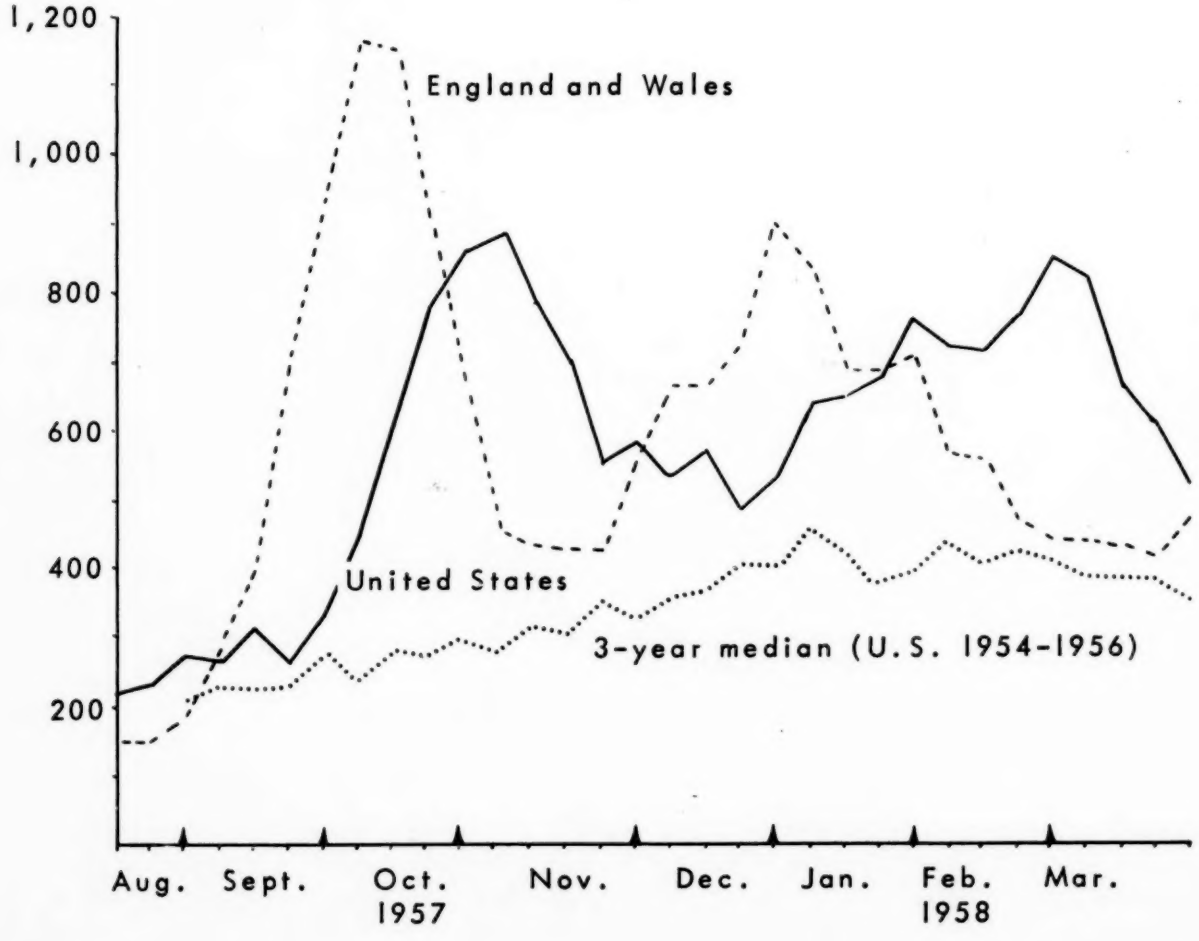
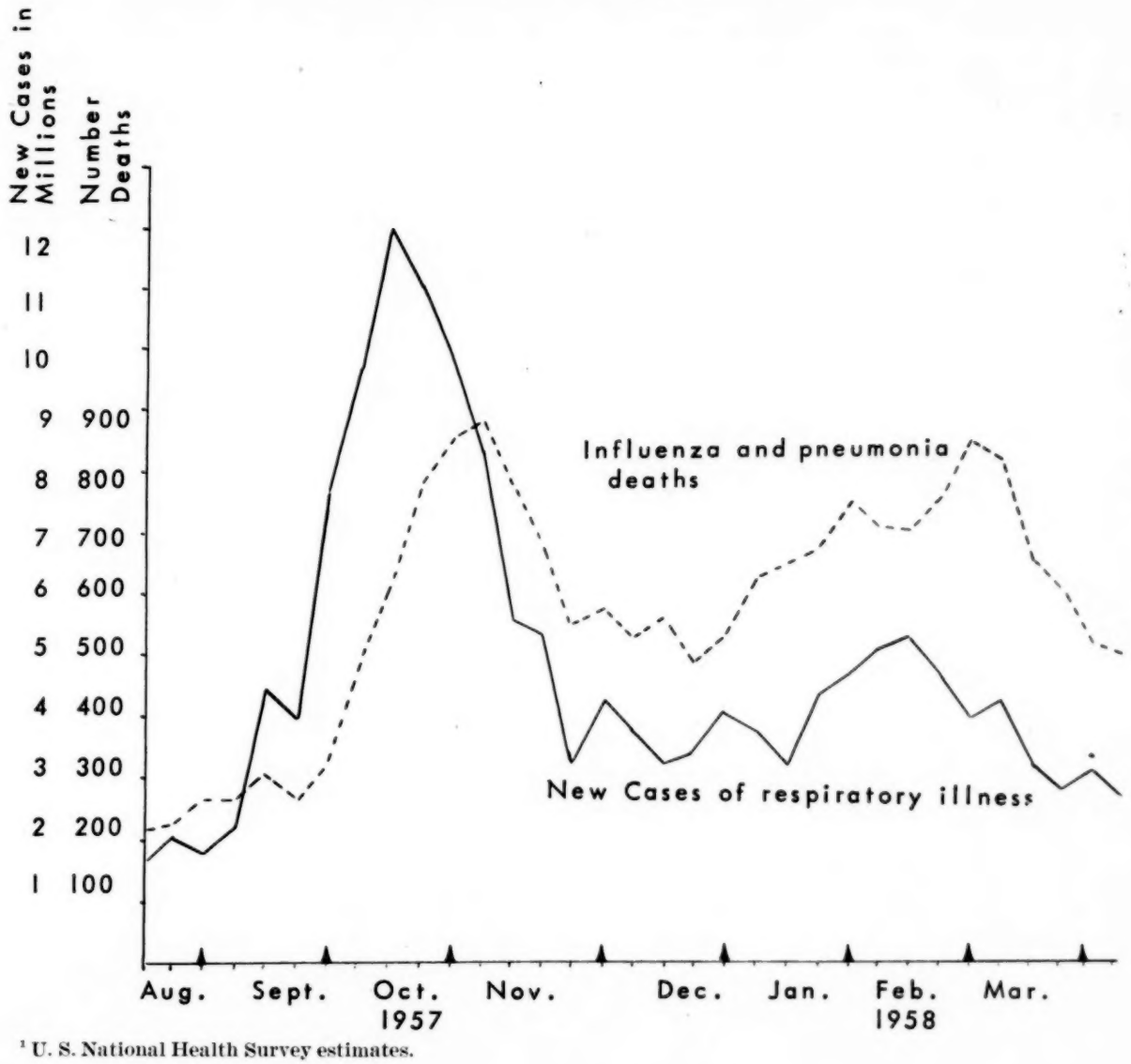


Figure 2. Estimated numbers of new cases of respiratory illnesses [1] and numbers of deaths from influenza and pneumonia, in 108 large cities, by week.



[1] U. S. National Health Survey estimates.

tional Health Survey and the numbers of deaths from influenza and pneumonia reported in 108 cities are shown in figure 2. As would be expected, morbidity rates from respiratory disease began to rise about 3 weeks before there was any apparent rise in mortality from influenza and pneumonia in the large cities. The peak in morbidity was also reached about 3 weeks prior to that for mortality. However, the second rise in mortality was not preceded by any rise in incidence of cases of respiratory disease. As a matter of fact, no rise in incidence was apparent until about 4 weeks after the beginning of the secondary rise in mortality, and that increase in incidence was moderate.

During the fall of 1957, deaths from influenza and pneumonia were above expected levels in the cities of all regions, but the excess was less pronounced in the West South Central, Mountain, and Pacific groups of cities. Such geographic variations have been common in previous epidemics. The second rise in mortality during January, February, and March 1958 was greater in the East North Central and West South Central cities. It was smaller in the West North Central and South Atlantic,

and was absent in the Mountain and Pacific cities. In two areas, the East and West South Central, the numbers of deaths from influenza and pneumonia in January and February 1958 equaled or exceeded those reported in October and November 1957. There were equally wide variations from city to city within most of the geographic divisions, that is, some cities reported more than the number of expected deaths from influenza and pneumonia in the fall, some during the winter, and others had significant increases in both the fall and the winter.

Mortality in the Nation

When mortality rates from influenza and pneumonia in the 1957–58 epidemic are compared with those for certain other recent epidemics, it is found that the death rates in 1957–58 were not excessively high, as shown in figure 3. The peak in the 1953 epidemic was reached in February when the mortality rate from influenza and pneumonia was 75.9 per 100,000 population, and in 1951 the peak was reached in March with a rate of 59.8. The peak in 1957–58 was reached in November when the rate was 66.6 or about midway between 1951 and 1953. In 1943, the peak month was February when the death rate from influenza and pneumonia was 94 per 100,000 population. However, the period of increased mortality extended over a longer period of time in 1957–58—about 6 months, compared with the usual 3 to 4 months.

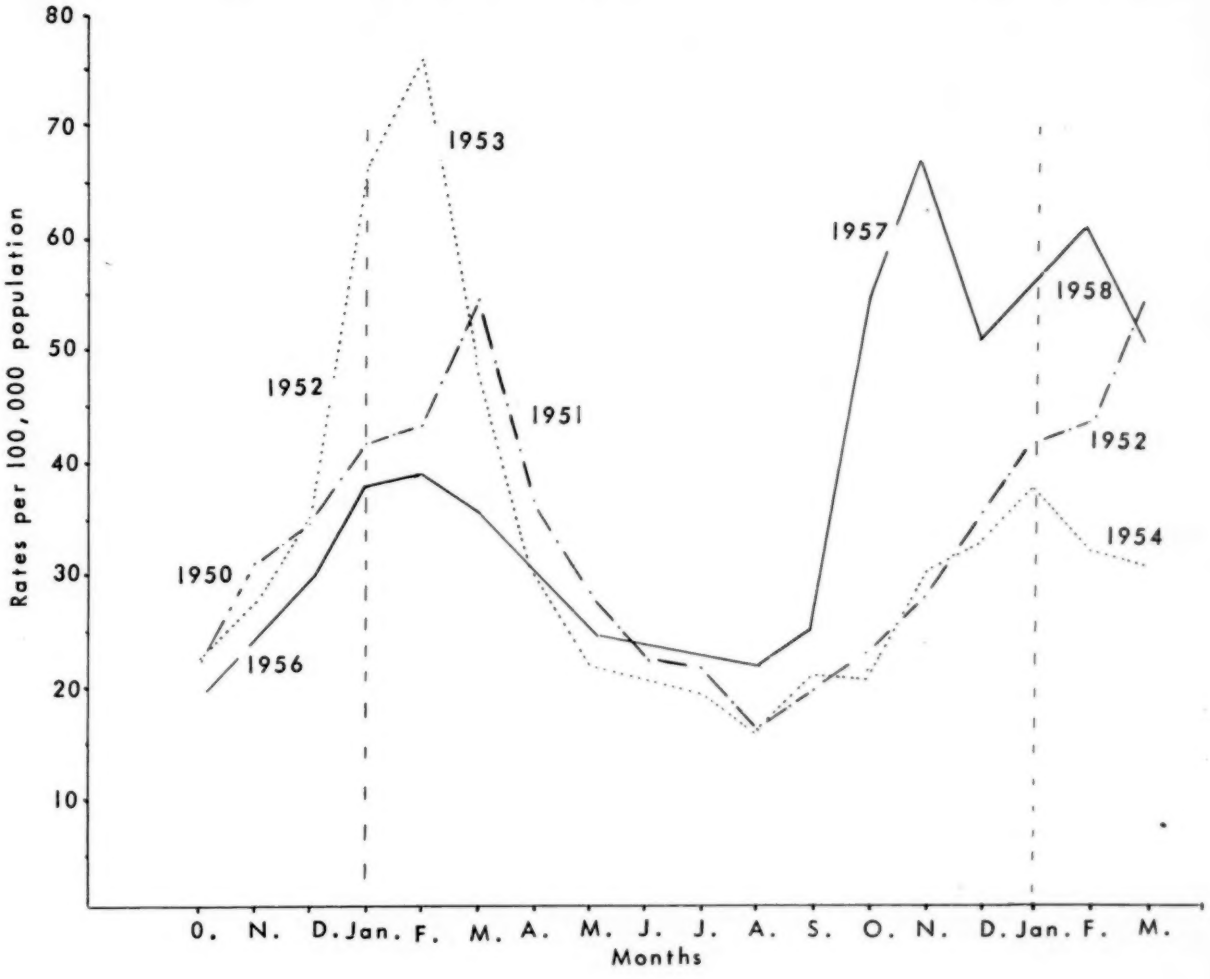
Excess Mortality

The number of deaths above that expected during a nonepidemic period, or the excess mortality, has been used by Collins to measure the effects of epidemics of influenza (*3, 4*). He has used this method since approximately 1930 to measure the size of epidemics and has shown that 21 separate ones have occurred since 1918–19. By using data from selected cities, Collins showed that excess mortality from influenza and pneumonia in these cities amounted to 99.3 per 100,000 population in 1920, 44.4 in 1928–29, 18.4 in 1936–37, 14.4 in 1943, 3.8 in 1951, and 6.9 in 1953. He also demonstrated that during influenza epidemics there had been an excess in mortality from causes other than influenza and pneumonia. This excess was mainly from cardiovascular diseases. Since 1918 when about 95 percent of the excess mortality was credited to influenza and pneumonia, there has been a gradual decrease in the proportion of

Table 1. Estimated number of deaths by cause for each month from September 1957 through March 1958 compared with estimates for that month in 1956–57

Month and year	All causes	Cardiovascular diseases	Influenza and pneumonia	All other causes
September 1957	123, 370	64, 680	3, 430	55, 260
September 1956	118, 280	62, 060	2, 610	53, 610
October 1957	150, 390	78, 800	7, 860	63, 730
October 1956	131, 610	69, 330	3, 430	58, 850
November 1957	145, 170	75, 560	9, 280	60, 330
November 1956	129, 070	70, 130	3, 990	54, 950
December 1957	152, 060	81, 690	7, 400	62, 970
December 1956	138, 520	74, 360	4, 760	59, 400
January 1958	153, 190	84, 960	7, 680	60, 550
January 1957	146, 380	81, 240	5, 410	59, 730
February 1958	143, 030	80, 750	7, 850	54, 430
February 1957	127, 600	69, 340	5, 010	53, 250
March 1958	144, 800	78, 450	7, 210	59, 140
March 1957	142, 510	77, 920	5, 210	59, 380

Figure 3. Estimated death rates from influenza and pneumonia, by month, 1951, 1953, and 1957.



the excess credited to this cause. In recent years, only about a quarter of the excess mortality resulting from influenza epidemics has been attributed to influenza and pneumonia.

In measuring the effects of the 1957–58 epidemic, excess mortality for the country as a whole was obtained by subtracting from the number of deaths during the period September 1957 to March 1958, those reported during the comparable period in the previous year. The 1956–57 period was considered normal because there was little influenza and the numbers of deaths reported were not greatly different from the 3-year (1954–56) mean and median numbers.

Since increases in mortality during influenza epidemics of the past decade or two have not been solely caused by influenza and pneumonia, data showing excess mortality from other causes are included. The estimated numbers for these categories are shown in table 1 by months from September 1957 through March 1958, and, for comparison, the estimated numbers for the previous year are given as well. The differences between the data for the two periods are shown in table 2. In the same table, these differences or excesses are also expressed as the excess number of deaths per 100,000 population for each month. They should not be confused with mortality rates for the various categories.

The excess mortality for the country as a whole as well as numbers of influenza and pneumonia deaths for the cities occurred in two phases or "waves." The first rose and fell with the explosive epidemic in September, Oc-

Table 2. Excess number of deaths by cause from September 1957 through March 1958 as compared with comparable periods in 1956–57

Month	All causes		Cardiovascular diseases		Influenza and pneumonia		All other causes	
	Number	Rate [1]	Number	Rate [1]	Number	Rate [1]	Number	Rate [1]
September	5,090	2.9	2,620	1.5	820	0.5	1,650	1.0
October	18,780	10.9	9,470	5.5	4,430	2.6	4,880	2.8
November	16,100	9.3	5,430	3.2	5,290	3.0	5,380	3.1
December	13,540	7.8	7,330	4.2	2,640	1.5	3,570	2.1
January	6,810	3.9	3,720	2.2	2,270	1.3	820	.5
February	15,430	8.9	11,410	6.6	2,840	1.6	1,180	.7
March	2,290	1.3	530	.3	2,000	1.2	−240	−.1

[1] Excess number per 100,000 population.

tober, and November 1957, and the second occurred in January, February, and March 1958 during a period of localized outbreaks, mainly in schools and institutional populations.

The greatest excess mortality from all causes occurred in October 1957, when incidence of respiratory illness was at its height. This was due mainly to the fact that deaths from cardiovascular diseases were excessively high. On the other hand, the greatest excess in influenza and pneumonia deaths occurred in November, coinciding with the peak in numbers of deaths from this cause reported by the 108 large cities. During this same period, excess deaths from causes other than cardiovascular diseases and influenza and pneumonia were highest.

Mortality during the second phase, during January, February, and March 1958, rose to a high level principally in the category of cardiovascular diseases. In February, the excess number for this disease category was 22 percent above the excess for the preceding October, while excess deaths from influenza were well below those reported in November. Deaths from all other causes were also well below the level reached in November.

While excess mortality from all causes during the last 4 months of 1957 amounted to 53,510 deaths, the effect on the general death rate of the United States was not striking. The provisional crude rate for 1957 was 9.6 based on the 10 percent sample of deaths as compared with 9.4 in 1956, or an increase of 2.1 percent. If the excess number of deaths during the last 4 months of the year were subtracted from the estimated total for 1957, the rate would have been about 9.3 per 1,000 which would have been lower than that for the previous year.

Table 3. Estimated death rates for influenza and pneumonia, by age group, for the period August through December in 1957 and in 1956

	All ages	Under 1 year	1–24 years	25–44 years	45–64 years	65 and over
1957						
August	21.6	161.5	3.3	4.3	15.0	140.5
September	24.6	179.5	5.9	4.2	17.2	155.1
October	53.3	274.1	16.8	19.4	49.7	294.1
November	66.6	321.0	13.7	18.2	63.3	404.6
December	50.2	377.6	12.3	11.6	43.3	290.0
1956						
August	19.8	97.0	4.0	2.5	16.0	141.8
September	19.2	130.3	3.6	3.1	15.1	125.3
October	23.8	217.3	5.1	3.0	14.9	153.5
November	29.2	250.6	4.4	6.8	16.1	189.7
December	33.8	340.1	8.2	5.1	22.1	190.1

Table 4. Excess mortality by age, September 1957 through March 1958

Age (years)	September–December 1957		January–March 1958		Total excess per 100,000 population
	Excess number	Excess per 100,000 population	Excess number	Excess per 100,000 population	
Under 1	1,670	44.0	490	12.9	56.9
1–14	2,270	4.7	650	1.4	6.1
15–24	490	2.2	150	.7	2.9
25–34	1,410	5.9	−430	−1.8	4.1
35–44	1,416	6.2	420	1.8	8.0
45–54	3,240	16.4	2,410	12.2	28.6
55–64	7,500	50.2	3,760	25.1	75.3
65–74	15,220	156.5	6,890	70.7	227.2
75 and over	20,310	405.2	10,010	199.7	604.9

Age Distribution of Deaths

The age distribution of deaths from influenza and pneumonia is available for the last 5 months of 1957. These have been compared with those for a similar period of 1956 (see table 3). These data show that, while all age groups experienced some increase in mortality rates, the highest rate per 100,000 population was in the very young age group under 1 year and in persons 65 years of age and over. There was a greater percentage increase in the rates in the age groups from 1 to 64 years, but this was not sufficient to change the contour of the curve of influenza and pneumonia mortality seen in recent epidemics.

The numbers of deaths by age groups in excess of those for the previous year are shown for all causes in table 4. Two periods of time, corresponding to the two phases of the influenza epidemic, are shown. The excess is also expressed as the number of deaths per 100,000 population above that for the previous year. These data show that 80 percent of the excess deaths from September to December, inclusive, occurred among persons above the age of 54 years. From January to March, inclusive, the proportion was 85 percent for the same age group. The proportions of the excess which occurred in infants were 3 and 2 percent, respectively, for the two periods of time. These data point up the vulnerability of persons in the older age groups during the recent influenza epidemic. The excess mortality in infants was relatively small and, in children and young adults, slight.

Discussion

The recent epidemic caused by the Asian strain of type A influenza virus appears to have been similar to the 1918–19 epidemic with respect to its seasonal occurrence. Both were characterized by localized outbreaks prior to the explosive type of infection early in the fall. Both were milder in the following winter months.

The recent epidemic differed from that of 1918–19 in that mortality this time was lower; most of the excess deaths were credited to cardiovascular disease, and deaths were relatively more common in older persons, in contrast with high mortality principally from influenza and pneumonia in young adults in 1918–19.

The epidemic of "Asian" influenza was similar in most respects to others caused by the A-prime strains during the past decade in which mortality was not excessively high; most of the excess deaths occurred in older persons; and a large proportion of excess deaths was credited to cardiovascular diseases. However, the 1957–58 epidemic differed in that the main or explosive part occurred early in the fall rather than in the winter, it was preceded by a series of localized outbreaks, and it was followed by a secondary rise in mortality with little evidence of widespread infection.

The very large excess in numbers of deaths

from all causes, and, especially from cardiovascular diseases, in January, February, and March 1958 is difficult to explain. There was no evidence of widespread occurrence of influenza at that time, and excess mortality from influenza and pneumonia was small compared with that of the previous October and November. The actual number of deaths from influenza and pneumonia was 2,000 less in February 1958, the peak month, than it was in November 1957 and the number which would be expected to occur was about 1,000 more in February than in November. Consequently, the excess was relatively small for this category. Persons in the older age groups, among whom most of the deaths occurred, may have had during this period respiratory infections that were difficult to recognize, possibly the reason why the majority of the deaths were credited to cardiovascular diseases. The suggestion also has been made that many of those who died in January and February had been weakened by attacks of influenza in the fall of 1957. Since a number of deaths during the epidemic in the fall were caused by staphylococcal pneumonia, the possibility that the increase in deaths in January, February, and March was due to this infection has also been proposed. Information from certain hospital centers and mortality data do not support this hypothesis. The reason for the increase in mortality during the last part of the winter remains unexplained.

The data presented in this report indicate very clearly that the total impact of the 1957–58 influenza epidemic on mortality cannot be approximated if only deaths credited to influenza and pneumonia are taken into consideration. The data show that the increase in the number of deaths credited to cardiovascular diseases accounts for approximately one-half of the total excess mortality. This is not surprising, since most of the deaths occurred in older persons, many of whom would be expected to have some evidence of cardiovascular pathology.

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CDC Courses in Insect and Rodent Control

Refresher training in insect and rodent control will be offered at the Communicable Disease Center, Atlanta, Ga., during September 15, 1958, through June 1959, according to the following schedule:

Insect control. September 15–26.
Rodent control. September 29–October 10.
Mosquito control. November 2–7.
Biology and identification of arthropods of public health importance. January 12–23.
Epidemiology and control of vector-borne diseases. February 16–20.
Insect and rodent control. June 1–12.

There are no tuition or laboratory fees for the courses. Students will be accepted from State and local health departments, the Armed Forces, and other organizations concerned with insect or rodent control. Qualified students from other countries will be accepted and given opportunity to study vectors of important diseases.

Application forms may be obtained from the Chief, Training Branch, Communicable Disease Center, Public Health Service, 50 Seventh Street, NE., Atlanta 23, Ga.

Despite both administrative and technical difficulties, public health officials have many resources to draw upon as they move to limit damage to the Nation's health by nuclear radiations.

Administrative Aspects of Nuclear Energy

E. C. ANDERSON, M.S.

THE PUBLIC HEALTH administrator looking at nuclear energy finds himself confronted with some unique problems. Some of these stem from the nature of radiation and its biological effects, and some from existing professional, administrative, and legal relationships, over which he has little control.

One unique aspect of radiation protection is that it presents an opportunity, if not a necessity, to develop special practical preventive measures beforehand, in anticipation of contamination, to prevent serious exposures of large populations. In the past, public health has been permitted to indulge in occasional lapses. The results of its failures have often inspired greater and stronger preventive measures. With respect to radiation, however, the penalty may be irrevocable and possibly final.

Nature of Radiation Hazards

There are both an abundance of data and a complete lack of assurance as to the nature and sources of the health hazards of radiation associated with nuclear energy, with the operation and products of nuclear reactors. While the precise biological effects of radiation are as yet uncertain, the current scientific consensus is that any dose of radiation is harmful to some degree. Therefore, any unnecessary exposure should be avoided. In other words, doses should be kept at a minimum, consistent with the benefit that will be gained from radiation.

A second general premise is that damage is irreversible and cumulative. Hence, all sources of exposure of individuals or populations must be considered, irrespective of their nature. Related to this aspect is the difference between two types of exposure: external, which results primarily from gamma and X-rays, and internal, from ingested or inhaled radioactive materials.

Also to be considered are two general types of effects: the short-term, acute effect that one normally associates with high dose rates resulting from an accident or a weapon; and the long-term, cumulative effect of low-level doses, usually associated with normal, civilian uses of nuclear energy but including even those slight but chronic doses associated with the widespread fallout from weapons testing.

Sources of Radiation

For complete perspective on nuclear energy, the administrator first needs to look at all the sources of radiation.

Everyone is and always has been exposed to natural background radiation. This radiation varies with geographic location, elevation, and other factors and includes both internal (natural radium, radioactive potassium, breathed radon and thoron, for example) and external

Mr. Anderson is chief of the Special Projects Branch, Division of Radiological Health, Public Health Service.

exposures. While not practically controllable, it contributes substantially to an individual's total lifetime exposure. It has been used as a baseline from which to compute maximum permissible doses.

Medical and dental uses of X-ray; medical, industrial, and research uses of radium and radionuclides; and industrial uses of X-ray are well-known controllable sources of radiation exposure.

The major prospective source of radioactive material and potential radiation dose, however, is the nuclear reactor. Reactors are becoming increasingly common as research tools in medical, educational, and industrial institutions and establishments. Power reactors for vessel propulsion have been installed by the Navy and are being applied to merchant vessels. The commercial power reactor at Shippingport, Pa., is now in operation, and many more power reactors are under development. We may expect a wide variety of operating reactors in and near populated centers within the next decade.

All reactors produce certain radioactive wastes. Such liquid, gaseous, and solid radioactive materials are usually treated or segregated at the reactor site or diluted in discharge. Extremely radioactive spent fuel must be isolated or removed from the reactor site for treatment at central chemical processing plants, as there is no way to reduce the radioactivity or shorten its duration. The major source of radioactivity is the fuel, which builds up radionuclides as a result of nuclear fission until fission is no longer practical and the fuel is "spent." To segregate fission products and recover fissionable fuels, spent fuel elements are processed at special plants owned by the Atomic Energy Commission and located on Federal reservations. AEC has requested proposals from private industry for the construction and operation of additional plants for chemical processing of spent fuel. Under investigation also is the possibility of continuous treatment of liquid fuels at the reactor site.

Wherever treatment is carried on, it is necessary to deal with treatment and disposition of low-level wastes; transportation of either highly radioactive spent fuel or fission products segregated from the fuel; and ultimate disposition of millions of curies of fission products, now mostly stored in tanks underground.

To recapitulate, reactors present a special challenge to air pollution control, industrial hygiene, water pollution control, solid waste management, transportation of extremely hazardous materials, and, above all, high-level waste disposition.

In addition to the hazards related to normal reactor operation, an accident, or accidental discharge of radioactivity, could produce immediate, acute contamination of areas outside the reactor site. The accident hazard cannot be fully evaluated, for lack of experience. It is real enough, however, to be causing concern to industry, insurance companies, and Congress. The consensus seems to be that there is no danger that a reactor will produce a nuclear explosion, but that a chemical or steam explosion in a reactor plant could seriously contaminate several square miles.

The final significant health hazard associated with nuclear energy is that resulting from military testing of nuclear devices and weapons. Tests by the United States, the U.S.S.R., and the British Commonwealth all have added measurably to background radiation. Except in the area surrounding the Nevada Test Site, tests have not added detectably to the gamma background as measured on a G-M survey meter. They have, however, added to the airborne radioactivity and to radioactive fallout, rainout, and washout. Health authorities are therefore less concerned with fallout as a source of background radiation than with the possible assimilation and concentration of long-lived radionuclides in all living organisms, with the prospect of injury from their chronic presence in human tissue. The full significance of this fallout is not yet known.

Administration and Standards

Unlike other health hazards, many sources of radiation produced by nuclear energy are beyond the direct jurisdiction of the local or State government. The Federal Government is exercising an unusual influence on both the development and control of nuclear energy. There are, of course, many reasons for this, such as the participation of the AEC in weapons development, national security implications, and

restrictions on many activities and much of the information related to radiation. Whatever the reasons, AEC is issuing licenses to and establishing health and safety criteria for private industries and users falling within the scope of the Atomic Energy Act of 1954.

This situation gives rise to a number of questions. In this country, the States have as one of their constitutional powers the protection of the public health. The question has been raised as to whether the licensing activity of AEC has preempted from the States the right to exercise control over AEC licensees. This specific question may be answered by a court decision or by legislation. The Atomic Energy Commission is currently proposing an amendment to the Atomic Energy Act which would, with certain reservations, recognize the States' right to exercise their police powers over nuclear energy. In any event, at this moment the respective authority of the States and the Federal Government in the atomic energy field is not clearly defined.

At present, both Federal and State governments have an opportunity to reduce the potential hazard. From a health standpoint, it makes no difference whether ionizing radiation comes from an X-ray machine or radium under State jurisdiction or radioactive substances under the control of AEC or foreign governments. The public health agency must consider all of these sources of radiation exposure in administering a radiation control program, even though it cannot assert complete control over manmade sources of radiation. If a State has already proceeded to regulate sources of radiation within its jurisdiction, it is in a far better position to challenge other radiation sources. Meanwhile, the public must look to higher authorities also, and not only to AEC. The AEC cannot legally exercise control over sources other than special nuclear materials, byproduct materials, and utilization and production facilities. Others have responsibility related to transportation of radioactive materials, weapons tests, and naturally occurring and machine-made radiation and radionuclides.

Resources Available

The public health administrator will find that there are a number of resources available to guide and assist in developing and carrying out a radiation protection program.

While the basic rule in radiation protection is that all unnecessary exposure to radiation should be avoided and that each exposure must be justified on the basis of benefit gained, one must also have a guide as to levels of dose and concentrations of radioactivity which call for special consideration in the light of assumed benefits. The parent group for developing recommendations on maximum permissible doses and concentrations of radioactivity in the environment is the International Commission on Radiological Protection. This body, composed of professional and scientific members from many countries, establishes basic standards and criteria which are the foundation of recommended standards, laws, and regulations.

In the United States, basic radiation protection standards are drawn up by the National Committee on Radiation Protection and Measurement, composed of representatives from a broad range of professional and scientific organizations. The committee operates through 11 subcommittees whose recommendations are published by the National Bureau of Standards. The publications of broadest interest to the public health agency are Handbook 52, Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water, and Handbook 59, Permissible Dose From External Sources of Ionizing Radiation. Others of the handbooks deal with more specific subjects.

The American Standards Association has created a Nuclear Standards Board, and has established under this board seven projects dealing with various phases of nuclear energy. Of particular interest to the health professions are projects N1, Glossary of Terms in Nuclear Science and Technology; N2, General and Administrative Standards for Nuclear Energy; N3, Nuclear Instruments; N6, Reactor Hazards; and N7, Radiation Protection. To date, the Nuclear Standards Board has approved, as an American standard, the Glossary of Terms in Nuclear Science and Technology, published in 1957 by the American Society of Mechanical Engineers. No other standards have been published as yet under this board but committees are active in their development.

The American Public Health Association has appointed a committee to work on radiation with the Association of State and Territorial Health Officers and the Conference of State Sanitary Engineers. This committee has prepared a policy statement, model legislation, and an orientation pamphlet, and is developing an administrative guide.

The Council of State Governments has also developed and recommended State legislation dealing with nuclear energy. This suggested legislation encompasses all aspects of the nuclear energy industry rather than health protection alone.

As mentioned before, the Atomic Energy Commission has established health and safety criteria applicable to licensees under the Atomic Energy Act of 1954. These have been published as Standards for Protection Against Radiation (10 CFR 20). While these apply only to establishments under the control of the AEC, they represent the only specific control in States that have adopted no laws or regulations to control radiation hazards. The regulations are based on but are not identical with recommendations of the National Committee on Radiation Protection and Measurement. Some States use these regulations as advisory guides in the absence of specific State regulations, while others use them as models in developing State regulations. The AEC regulations do not cover all sources of radiation, however, and are not entirely applicable to State control.

Role of the Federal Agencies

The Federal Government exercises a greater influence and plays a more direct role in radiation protection than in any other public health program.

The greatest part of the Federal resources is being devoted to military applications. In order to monitor the products of weapons tests, the Public Health Service, under agreement with the Atomic Energy Commission, operates a radiation surveillance network composed of 43 stations equipped to collect air and rain samples and take daily gamma readings. These stations, which also estimate the amount of radioactivity in particulate matter collected from air samples, are operated by State and local health department personnel. Samples are sent to a PHS laboratory in Washington, D. C., for final counting. Results of the surveillance estimates are immediately made available to the State health officers concerned, and weekly reports of the laboratory are sent to all State health officers.

A Medical Liasion Officer Network, composed of medical personnel from the Public Health Service and State and local health departments, also under agreement with AEC, is available to investigate reports of injury allegedly due to fallout.

With respect to civilian applications of nuclear energy, the AEC plays the Federal Government's major role in radiation protection. The operating arms of AEC dealing with civilian uses of nuclear energy are the Division of Licensing and Regulation, the Office of Industrial Development, and the Division of Inspection.

The Division of Licensing and Regulation handles all regulatory matters, other than inspection activities. Among these are the preparation, issuance, and administration of regulations, issuance of licenses, development of standards, guides, and codes for the safe design, containment, and operation of reactors, and evaluation of the safety aspects of all proposed reactors. Included is responsibility for developing regulations and licensing procedures for the safe handling and use of radionuclides, source material, and special nuclear material.

The division is also responsible for assessing the requirements of the private nuclear energy industry for nuclear materials such as uranium, thorium, and plutonium, and for administering the allocation and distribution of these nuclear materials to licensees.

The Office of Industrial Development, in consultation with other offices and divisions, develops AEC policy and procedures for encouraging the growth and development of peaceful uses of atomic energy. It advises private groups on opportunities open to them. It seeks to identify industrial activities, including those now performed by AEC, which lend themselves to private undertakings, and assists in encouraging industry to enter these fields.

A major function of the office is the develop-

ment of programs to accelerate the use of radionuclides and applied radiation in industry, agriculture, and medicine, and to encourage industrial production and distribution of radionuclides and other radiation sources. In addition, it administers AEC's program for granting access to restricted data pertaining to civilian uses of nuclear energy.

The Division of Inspection is responsible for inspecting license holders to determine compliance with the terms of their licenses. As a general rule inspectors from the division will work with State agencies or keep them advised of their activities.

The basic function of the Public Health Service is to strengthen the capacity of the States to use their powers for the protection and promotion of the public health through radiation protection. The Service also performs activities beyond the powers, competence, or financial ability of the individual States. Thus the functions of the Service may be divided into the following major components:

- Assistance to States: training, consultation, and technical assistance.
- Dealing with interstate problems: pollution of air or interstate streams.
- Collaboration with other Federal agencies or scientific groups on problems which have a health component and need to be dealt with at the national level: exposure tolerances, safe transport, uniform reporting, model legislation, and codes, for example.
- Research, development, and research training: in PHS installations and by extramural grants and stipends.
- Public information.
- Radiological intelligence: nationwide collection, analysis, and dissemination of data useful in conducting radiological health programs.

The Department of Agriculture has a general interest in radiological health to the extent that individuals who produce, handle, process, and market farm products, and the animals and plants upon which this country depends for food, fiber, and other agricultural materials, are affected adversely by radioactive materials. Adverse effects include not only the impairment of health and comfort but the retardation of normal growth and development and accumulation of radionuclides in animals or plant products destined for the food market.

In the Department of Commerce, the National Bureau of Standards is concerned with the measurement of radiation dosages, and physical methods of assessment and control through proper design. The Bureau also sponsors the National Committee on Radiation Protection and Measurement, which is the major authority in the establishment of radiation protection standards in the United States.

The Weather Bureau constitutes an important resource in providing an understanding of the dynamics of natural and manmade radioactivity in the atmosphere. Its forecasting services predict local meteorologic conditions which guide design and operations in minimizing radiation exposure.

The Department of Defense's interests are related to the development, transportation, and detonation of nuclear weapons in peace and war; the effects of nuclear war; and the military applications of nuclear energy for propulsion, food preservation, and packaged power. Operators of military sources of nuclear energy tend to be of ages at which genetic injury has implications more grave than it does for the average industrial or medical users of radiation.

The National Science Foundation has a direct interest in radiation stemming from its statutory responsibilities. Many problems of basic physics, biophysics, genetics, and biology must be solved before a truly scientific approach can be made to the development of health standards suitable for an economy utilizing nuclear energy extensively. Certain grants and fellowships awarded by the National Science Foundation encourage fundamental research in the field of radiological health.

The Food and Drug Administration is interested in the potential contamination of foodstuffs and the assimilation of radioisotopes of elements naturally absorbed by crops grown for food. It is also interested in the effects of radiation used to process foods.

The Children's Bureau of the Social Security Administration has an interest in radiation as it affects the health of children.

The Office of Education's interest lies in the need for training of personnel in nuclear energy and in radiological health.

The Department of Labor is interested in protecting employees exposed occupationally to radiation.

Role of State and Local Governments

Much of the work of the 48 State health departments is advisory and consultative. They establish standards and program policies which are used as guides by local health departments, to whom they have delegated much of the responsibility for applying protective measures. They also provide technical services which are beyond the resources of the local health department.

The States have universally retained final authority with respect to approval of plans for construction and operation of public water supplies, treatment and disposal of sewage and industrial wastes, and control of water pollution. Many are now becoming interested in the control of air pollution. Many also review and approve building plans to assure that the industrial hazards to health are adequately controlled before operations are started.

A pattern may now be developing in the relationship between the Government-sponsored nuclear energy industry and the State agencies. It is urgently desired that the industry be supplied with design and operational health and safety criteria which permit the least restrictions on economy of operation. These, in part, are furnished by the AEC Standards for Protection Against Radiation, which establishes the maximum operational levels acceptable to AEC.

State health agencies, with a broad concept of radiological health, are concerned with the total radiation exposure of the population, no matter what the sources of exposure might be. At present, for example, the principal sources of exposure to radiation of a community are, probably, natural background radiation and medical diagnostic X-ray. Health agencies, if they desire to restrict public exposures to a practical minimum, will admit additional sources of radiation only when it is demonstrable that little increase is anticipated and that the possibility of individual hazard is minimized by adequate control procedures.

Obviously, the workload facing the inspection division of the AEC is sizable. The need for time and experienced personnel will impede its development of a nationwide system designed to relate the levels and effects of radiation to the multitude of public health hazards. The only experts today on integrating the nuclear industry into local situations are the State and local people who deal with public health matters exclusively. The Atomic Energy Commission and the nuclear industry need the assistance of the States and their ability, knowledge, and authority, even as the States need the specialized skills in organizations sponsored by the Federal Government.

The Atomic Energy Commission, by means of its proposed health and safety standards, is showing commendable concern over the eventual effects on the public health that radioactive material may have. No matter how intensive AEC's inspection of its contractors and licensees may be, however, its actions cannot be construed as the practice of public health, although they may make substantial contributions. The responsibility for safeguarding the public health, in any event, still lies with the States and the State and local health agencies.

State Programing

The States, in this position, are looking to their individual problems and equipping themselves to meet them. Their first action in going into the field of radiological health is to seek technical competence in staff. Ideally, they would prefer 1 or more years of graduate training for 1 or more staff members, depending on the needs within the State. Alternatively, and on an interim basis, competence is cultivated in present staff members working on programs, such as water pollution control, associated with nuclear energy. Such staff members may attend short, topical courses of the type offered by the Public Health Service at the Robert A. Taft Sanitary Engineering Center in Cincinnati.

Another early step is to define the needs. Some agencies have utilized existing programs to secure information on radiation sources. Others have enacted legislation specifically authorizing State agencies to conduct a radiation survey. Still others require all users of ionizing radiation to register.

Detailed regulations can best be considered after the needs of the State have been defined. National Bureau of Standards Handbook 61, Regulation of Radiation Exposure by Legislative Means, forms as good a basis as is currently available for the development of such regulations. However, this handbook was not designed to be adopted in toto or verbatim, but to be used as a guide. At the same time, all regulations must be based on the same standards, the recommendations of the National Committee on Radiation Protection and Measurement, which is uniquely qualified to appraise radiation hazards. An impossible situation would develop if individual States and AEC adopted conflicting standards.

The specific organization within a State agency for radiological health will vary, depending on a number of factors. If a significant problem exists in a State, it appears advantageous to designate a person or a specific administrative unit as the central point for radiological health. This person or unit may then be the principal point of contact with other interested agencies and can furnish technical assistance to other programs.

In some States, it is perfectly possible that a satisfactory program can be established by adding to each program, such as water pollution control, air pollution control, and milk and food sanitation, the necessary radiation protection responsibilities. This method would be particularly likely if the only radiation protection required were, for example, related to occupational exposure.

A program of radiation protection is complex both technically and administratively. However, with their wealth of experience in public health and with the resources available to assist them, health officials are in a position to move forward in this field as they have in others.

Institute of Veterinary Public Health Practice

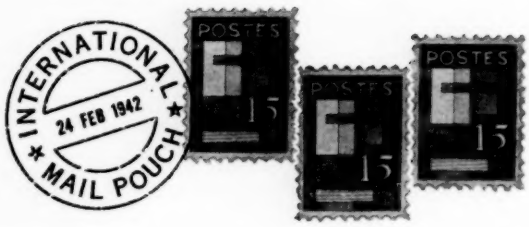
The first institute of veterinary public health practice, to be held October 6–9, 1958, at the School of Public Health, University of Michigan, will stress the use of veterinary resources in disciplines of human health.

Speakers include Margaret G. Arnstein, Dr. Gaylord Anderson, Dr. James H. Steele, Dr. H. J. Stafseth, Dr. W. W. Armistead, Dr. T. J. Francis, Jr., Dr. Mark W. Allam, Dr. Albert E. Heustis, Dr. E. H. Cushing, and Dr. R. E. Rebrassier, among a number of others.

Topics scheduled for discussion are the possible contributions of veterinarians and veterinary research to such fields as nursing, geriatrics, mental illness, human cancer, heart disease, industrial hygiene, and radiation hazards.

In separate working sessions under the leadership of five section committees, participants will discuss the most effective ways of using public health veterinarians, private practitioners, regulatory officials, and industrial veterinarians in official and voluntary health programs. The conclusions will be presented in general session.

For more information write to H. E. Miller, Director, Continued Education, School of Public Health, University of Michigan, 109 South Observatory Street, Ann Arbor, Mich.



After the Earthquakes

Continued shocks, horror, grief, hunger, and bitter cold nights virtually paralyzed the people after a series of earthquakes in the provinces of Kermanshah and Hamadan in western Iran in December 1957.

An avalanche of vague, conflicting rumors reached the health department in Kermanshah after the quakes. The more serious seemed to generate from Farsinage, Assadabad, Fash, and Sarab-Sahneh. We dispatched a doctor and a nursing team with first aid supplies, medications, and powdered milk to each location.

I visited Sarab-Sahneh and Fash and later went to the Assadabad area where I found our team in Sirvan, a badly devastated village. We borrowed a tent from the army troops sent there to assist in relief work, and set up a first aid shelter. Nurses prepared hot milk in a salvaged *deeg*, or pot, for the children and mothers. They gulped the milk hungrily; it was the first real nourishment they had had since the disaster some 30 hours before. They had devoted the previous daylight hours to burying more than 40 people killed in the quakes, and the villagers had neither time nor facilities to feed their children or themselves.

From Teheran the U. S. Operations Mission headquarters sent three trucks loaded with 5,000 kilograms of dried milk, perchlorine, and DDT dusting powder. The head of the General Department of Public Health of Iran came from the capital with a crew of engineers, nurses, nurse aides, and sanitary aides. They brought tents, blankets, dried milk, vaccines, biological supplies, DDT, and bandages to the stricken areas.

Luckily the water supply was not damaged; almost all the villages used mountain springs, which, if affected at all, regained their original quality and volume within a few hours after the tremors.

Sanitary aides worked to provide safe excreta disposal. Under the chaotic conditions, conservative farmers were reluctant to use the unfamiliar latrines. In the press of construction, the privies were not always built in accordance with religious requirements, not always equipped with elevated foot rests, and sometimes lacked even a solid roof.

However, a mere 13 sanitary aides with leadership, a bit of salesmanship, a measure of health education, and a willingness to work with their own hands dotted the landscape with sanitary latrines. Sanitary aide Rostenpour alone was instrumental in building 65 at Farsinage.

—ARLENE WALDHAUS, *public health nurse, and* GLEN W. MCDONALD, M.D., *chief, Public Health Division, U. S. Operations Mission, Iran.*

Chilean Plan

Chile may be the first nation in the world to have at each of its normal schools a faculty member trained in public health.

The Ministry of Education has arranged to have 5 professors from teacher training institutions study at the University of Chile's School of Public Health each year until all 15 of the country's normal schools have a faculty member so trained. A member of the ministry's staff, who is already studying at the school, will develop a department of health education to serve the schools of Chile.

—G. HOWARD GOWEN, M.D., *chief, Health and Sanitation Division, U. S. Operations Mission, Chile.*

Typhoid in Pusan

More than 30,000 people visited an exhibit entitled "Rodents and the Damage They Cause" last winter in Pusan, Korea. The exhibition in the Republic of Korea Information Building and the distribution of a million packages of rodenticide and 50,000 rat traps were part of a rodent eradication campaign.

Pusan had an outbreak of typhoid fever, with 153 cases reported in less than 3 months. To curb transmission of the agent, we cleaned and chlorinated wells and stressed the need to boil drinking water. Efforts to give typhoid vaccinations, particularly to people in the refugee areas, however, met with considerable resistance.

—ALFRED S. LAZARUS, PH.D., *acting chief, Health and Sanitation Division, U. S. Operations Mission, Korea.*

Courses sponsored by the health agencies of five Michigan counties gave nursing home personnel new understanding and a new outlook on their jobs.

Saginaw's Training Courses for Nursing Home Staffs

RALPH E. LEWIS, M.P.H.

FORESIGHTED nursing home operators, realizing that even years of practical experience may not be adequate in coping with the various behavior problems of aged patients, are seeking training for themselves and their employees.

As they see the elderly patients in their homes become more withdrawn, less self-sufficient, and less cooperative, the operators recognize that these people need skilled assistance. And operators are acknowledging that nursing home personnel need training and specialized study to compete successfully in a rapidly expanding field of enterprise.

This was the case in Saginaw County, Mich. In the fall of 1956 the need for some such training was discussed at a meeting of the Saginaw Valley Community Health Services, Inc., a corporation organized in 1952 by the public health agencies of Saginaw, Bay, Midland, Isabella, and Tuscola Counties to provide public health services on a regional basis. Community Health Services then offered a plan for a training course to the Saginaw Association of Approved Nursing Homes. Later several members of the association discussed the need for training with officials of the Saginaw County Health Department.

Mr. Lewis, program coordinator for the courses he describes, is health educator of the Saginaw County Health Department, Saginaw, Mich.

Because an area wider than Saginaw County was concerned, the matter was submitted to the board of directors of the Saginaw Valley Community Health Services. After some discussion the board authorized a committee of the health officers of the member counties to explore the possibilities of training nursing home personnel.

The health officers invited representatives from the area's nursing homes, local and State health departments, Saginaw County Hospital, and the University of Michigan's Division of Gerontology and School of Public Health to form an advisory committee to determine the feasibility of developing some type of training for the staffs of nursing homes in their five-county area. Advisory committee members with interests and associations in nursing home administration in Michigan and the Saginaw Valley were appointed.

The committee had many questions. Was a training program really needed? Who would be eligible to attend this training? What subject matter should be covered? Who would the instructors be? How lengthy a course was necessary? Would a single course or successive courses be advisable?

The advisory committee met with the area's nursing home administrators at a regional meeting, visited some of the homes, and talked with employees, patients, and administrators to find answers to these questions.

On June 1, 1957, the advisory committee reported to the board of directors of the Saginaw Valley Community Health Services that nursing home personnel wanted and needed educational training, and that a course was feasible, practical, and desirable.

Saginaw Valley Community Health Services, Saginaw County Hospital, and the Division of Gerontology, University of Michigan, agreed to establish and jointly sponsor an experimental training program for nursing home administrators and employees.

After outlining the administrative details, the committee presented the program to the Saginaw Association of Approved Nursing Homes. The association formally approved the course and urged its members to take advantage of it.

Planning the Course

The first course was scheduled to begin June 12, 1957, with 12 weekly sessions held from 7–9 p.m. in the auditorium of Saginaw County Hospital. The trainees' needs and their reactions to these sessions would determine whether the original course would be repeated or a more advanced course offered.

Initially, the advisory committee recommended that the course be open to all persons actively employed in nursing homes, homes for the aged, and county infirmary hospitals in the five counties. The area has 42 of these institutions with a combined capacity of more than 800 beds. Enrollment was encouraged rather than restricted at first; if necessary the class would be divided into smaller groups.

Notices announcing the training course were sent to the 32 nursing homes, 7 homes for the aged, and 3 county infirmary hospitals in the 5-county area. While no enrollments were solicited from institutions outside the 5 counties, staff members from other counties who wanted to take the course were accepted.

A nominal registration fee of $10 per person was charged to defray the instructors' honorariums and other operating expenses. We also felt that the student who pays for a class is more likely to attend in order to get his money's worth. We planned to issue attendance certificates to those who attended 10 of the 12 sessions.

Instructors were drawn from qualified sources nearby to keep the program identified locally. Many were in professions dealing with patients similar to those in nursing homes. Some came from the Saginaw County Hospital, the Veterans Administration Hospital, and the local Salvation Army unit, which operates a home for the aged and a golden age club. Others, chosen because of their interest and special knowledge in problems of the aged and chronically ill, were from the State health department, Michigan Board of Pharmacy, Saginaw County Health Department, University of Michigan, and Mt. Pleasant State Home and Training School.

Course Aims and Content

The course was aimed at aiding administrators to operate their homes more efficiently and in the manner most satisfactory to themselves, their employees, and the patients. It was designed to acquaint them with current philosophies of care and rehabilitation of the aged and chronically ill. The course sought to make the staffs of the homes aware that patients have many of the desires, motivations, needs, and likes of all people, and that the aged especially treasure an extra bit of special attention.

The committee felt that staff members who adopted these ideas might significantly improve the quality of their services.

The advisory committee decided on the course's content after meetings with area nursing home personnel. The content was arranged to give the nursing home people a refresher course in their everyday tasks, such as housekeeping, bed-care techniques, and keeping records and reports; to assist the employee in using his equipment and facilities to do better, more efficient work; and to help the administrator use his employees most effectively.

These were the 12 sessions in the first course:

1. The introductory class session was entitled "Opportunities for Nursing Homes and County Infirmary Hospitals in the Treatment of the Aged and Chronically Ill." A professor of gerontology outlined the history of the nursing home in the pattern of medical care of the aged in the United States and evaluated the future of the nursing home.

2. "Patient and Personnel Relations" was presented by a registered nurse who is an assist-

ant hospital superintendent. She considered the qualifications of a good administrator and an efficient employee and the importance of their attitudes toward patients.

3. "Bed Care of the Long-Term Patient," was discussed by a registered nurse who is an instructor of nurses. She demonstrated bed-care methods and displayed materials to make the patient's life more comfortable and enjoyable and the employee's job easier and more efficient.

4. A lecture on the "Medical Needs of the Aged and Chronically Ill," presented by a physician, emphasized the physical, mental, and emotional changes that take place as a person grows older. He described some of the physical and mental needs of the aged and chronically ill, and told how a nursing home staff can assist the physician in taking care of individual patients.

5. A session devoted to "Rehabilitation," designed to introduce the two succeeding sessions on physical therapy and occupational therapy, was also conducted by a physician. He reviewed the newer philosophies of rehabilitation, its aim and function in working with the aged, long-term patient. He also showed the film "Still Going Places," which dramatically illustrates practical ways to help chronically ill or acutely disabled patients of advanced years to live useful, self-sufficient lives.

6. "Physical Therapy," conducted by a registered physical therapist, included a brief historical review and demonstrations of various methods and techniques of physical therapy which can be effectively used with specific types of patients.

7. During the "Occupational Therapy and Hobbycraft" session, motivation and techniques in introducing occupational therapy were discussed, new ideas in the field were explained, and sources of supplies were listed by the two speakers, a registered occupational therapist and a hobbycraft instructor.

8. A nutritionist and a dietitian concentrated their efforts on "Nutrition and Menu Planning." They emphasized the importance of good nutrition for the aged and chronically ill, special diets, meal planning, economical food purchasing, and efficient methods in the kitchen.

9. A sanitary engineer discussed "Sanitation" with emphasis on food handling, dishwashing, construction and design of nursing homes, and safe and sanitary practices for employees and patients. He also reviewed the sanitation regulations governing nursing homes and homes for the aged.

10. A psychiatric social worker dealt with "Mental Health and Psychological Needs and Motivations of the Aged." She described the importance of satisfactory relationships between the patient and the employee, and the employee's need for healthy attitudes and feelings toward the patients in his care.

11. "Recreational and Social Opportunities" for patients was presented by a Salvation Army major. He reviewed what homes in other countries are doing and what is being done in this country, and discussed practical recreational and social activities applicable to patients in nursing homes.

12. The final class session, conducted by two State drug inspectors, dealt with "Dispensing of Drugs and Narcotics" by the nursing home owner to his patients, and his legal responsibilities.

Evaluations

At the opening class 30 people from 15 homes registered. Additional registrations throughout the course brought the final total to 44 students from 21 institutions. Three counties outside the immediate five-county area were represented. Four of the students traveled more than 200 miles for each class session. Among the students were 21 administrators and 23 employees, including 2 private duty nurses. They represented a total of 16 nursing homes and 5 homes for the aged.

The 21 administrators averaged 10.7 grades of school completed, the 23 employees slightly less, with 9.65 grades completed. The administrators averaged 9.25 years of experience in nursing home work and the employees, 5.9 years.

Among the 44 persons enrolled were 1 registered nurse and 2 registered practical nurses; 4 others listed their titles as practical nurse.

No record was kept of who paid the registration fees, but we learned that in two instances

fees were paid by the board of directors of nursing homes, and 2 employers paid the fees for their employees, 5 employees in one instance, 3 in the other.

Early in the course, when it became evident that the trainees were not accustomed to taking notes and were losing much helpful information, mimeographed, detailed summaries of each instructor's presentation were made available on a trial basis. These proved to be very popular with the students, and the summaries were continued.

At the 11th session, a single-page questionnaire of 11 subjective questions, to be answered anonymously and returned a week later, was given the trainees. This questionnaire was an effort to ascertain what they had expected to get out of the course, what additional topics they believed should have been included, and what topics they would have eliminated. The participants were also asked about such matters as the coffee break and the time and length of the class sessions.

The trainees had had numerous opportunities to express their desires and preferences during class, but they were questioned at the end of the course so that their opinions would cover all the sessions and be useful to the advisory committee in planning future courses.

Seventy-one percent of the questionnaires were returned and provided valuable information concerning the students' reactions.

For example, the instructor who "had no idea of our problems" or who "didn't apply his subject to our situation" was immediately unmasked by the students. The trainees felt that two of the instructors were not well enough acquainted with the specific problems of caring for the aged and chronically ill patient. However, the majority of the students felt that most of the instructors' subject matter was "very practical and worthwhile" and that the suggestions "worked with our patients."

While the students generally approved the choice of subject matter, they felt they needed more detailed instruction in meal planning, techniques of bed care, motivation of the patient in areas of rehabilitation, and means for satisfying the patients' emotional and mental needs. Numerous trainees suggested eliminating physical therapy, because "our patients are too old" and "we don't have the time to spend doing it." Generally, they also felt that the session on "Drugs and Narcotics" was only of interest to administrators and therefore should be dropped.

Although the instructors tried to draw the students into group discussions, they did not always succeed, possibly because of the instructor's lack of skill, or simply because of the trainees' reluctance to speak out. Yet 55 percent of those who responded to the questionnaire thought that more group discussion was needed and would make the training sessions more meaningful. This suggestion was emphasized by the fact that many students gathered around the instructor to ask questions and express opinions during the coffee break and after class, although they had failed to respond to the instructor's repeated attempts to draw them into group discussion during the session.

Attendance remained unexpectedly high throughout the course, with not more than five persons absent from any one session, despite some very bad driving weather. Of the 44 registrants, 38 qualified for attendance certificates; 5 of the 6 who failed to qualify attended classes in the second course and received attendance certificates.

Second Course

Because of the success of the first course, and the continuing need for this training, a second course, to begin early in October 1957, was initiated.

Representatives of the advisory committee discussed the second course with members of the regional nursing home association. They planned the second course after considering the results of this discussion and evaluating the questionnaires from the first course.

The second course was essentially the same as the first. Less than half of the nursing homes in the five counties were represented at the first course, and we hoped that additional homes as well as other employees from those previously represented would participate.

One major change was replacing "Drugs and Narcotics" with a session on "Rules and Regulations." "Rules and Regulations" was added so that a representative from the State health

department could review Michigan's new rules and regulations for nursing homes and homes for the aged, adopted in July 1957.

Twenty-five persons, 6 administrators and 19 employees representing 8 homes and 6 counties, registered for the second training course. An administrator and 3 employees came from 2 counties outside the 5-county area. Four homes in the 5 counties were represented for the first time, sending 5 administrators and 13 employees; 4 of the homes represented at the first course sent 1 administrator and 6 employees to the second.

Attendance was good at most class sessions, and all of the 25 people registered qualified for the attendance certificate.

Conscious of the earlier trainees' comments, many instructors attempted, with varying results, different techniques of group dynamics to draw the students into discussions. Arranging the trainees' chairs in a semicircle facing the instructor, and having each student introduce himself at the opening session made the classes less formal and more relaxed.

The instructors also attempted more demonstrations with the trainees participating. At the session on physical therapy the trainees, after watching a demonstration on massage and limb manipulation, practiced on a "patient." The instructors in occupational therapy and hobbycraft showed how to make a Christmas corsage and how to weave a potholder; then the students were given materials and encouraged to use their imaginations in making corsages and potholders.

In their evaluation questionnaires the majority of those in the second course commented favorably on the effectiveness of the group discussion and student participation in certain sessions, justifying the inclusion of these practices in the training course.

The advisory committee has met with the Saginaw Association of Approved Nursing Homes a number of times since the second course ended. The nursing home group commended Saginaw Valley Community Health Services for its service to the nursing homes in the area and inquired about future courses. The interest that has continued after the first two courses has justified plans for a third course, containing new subject matter. We hope it will be part of a continuous series of training sessions for nursing home administrators and employees in the Saginaw Valley.

Planned for these future courses are detailed subject matter on nursing techniques, including bed and tub baths; comfort and safety devices, such as methods of lifting and moving patients in bed and from beds to chairs; the mechanics of taking temperatures, pulse, and respiration; and general care of the patient's skin, mouth, hair, teeth, and feet.

Conclusions

These two training courses have demonstrated that many nursing home administrators and their employees recognize their own need for help and guidance in their profession, and that they are willing to attend and support organized training which seeks to fulfill their needs.

Independent observations by health department officials who inspect and supervise nursing homes in this area, as well as opinions from certain nursing home administrators, indicate that those who have taken one of the training courses appear to have somewhat modified their attitudes and thinking toward their jobs and the patients in their care. This conclusion is evident in the better quality of work they are doing.

During the class sessions, the students' faces reflected new understanding and new enthusiasm for their jobs. Time and time again they asked the instructors for solutions or suggestions on their specific problems, indicating a desire to act positively.

The actual results of these courses cannot be measured. But the sponsors feel that they were a constructive first step toward improving the nursing homes in the area. If the trainees have learned that patients are people who react and respond as do all other human beings, that nursing home staffs have the power to make life pleasant and worthwhile for their patients, then the students, having gained a new outlook, will do their jobs better.

Those who have worked so diligently to make these courses a reality know that such training is not a panacea. However, they believe that education is the best way to improve habits, attitudes, and conditions in the nursing homes.

The Orthopsychiatric Approach

to mental health

CONFERENCE REPORT

At the 35th annual meeting of the American Orthopsychiatric Association, held in New York City on March 6–8, 1958, 70-some papers were presented on various problems of human behavior.

The Association, formed in 1924, is primarily concerned with the development of an integrated approach to the understanding and treatment of human beings as physical, mental, and social entities. It seeks to promote "straight-mindedness" (which the term "orthopsychiatry" connotes), essentially in preventive, therapeutic activities. The annual meeting serves as a forum and a unifying force for psychiatrists, clinical psychologists, psychiatric social workers, and allied specialists concerned with emotional and mental illness.

Eleven papers from the meeting, summarized on the following pages, present several facets of the orthopsychiatric activities.

Need Cited for Attention To Basic Sciences

Unless orthopsychiatry takes cognizance of the work being done in the basic sciences, it may well be a horse-and-buggy discipline in a world of motor cars, warned Dr. Reginald S. Lourie, president of the American Orthopsychiatric Association, and director, department of psychiatry, Children's Hospital, Washington, D. C.

Lourie stressed the basic work of neurophysiology and neurochemistry as having "profound implications for our patterns of professional work in the future."

Some of the factors that threaten to mire down the horse and buggy, he said, are the advent of new drugs, the future of psychoanalysis in light of the advances in biochemistry, and management of brain-damaged children. The development of tranquilizers, the salvaging of babies, many of whom have brain injuries, and discoveries in cytological life functioning are part of the new, "motorized" age, he said.

The main thing, Lourie urged, is to see that these sciences cooperate in interdisciplinary roles. He suggested five ways in which the orthopsychiatric profession can prepare itself to advance its interdisciplinary status:

- Communication patterns need to be clarified. Nomenclature common to different disciplines has different meanings ("energy" and "activity," for example). Semantic differences can be overcome if modifications can be accepted as natural, useful, and foreseen eventualities. "Freud himself," Lourie commented, "felt that his ways of describing the phenomena he found were modifiable. He changed his concept, for example, of psychologically based drives to one of forces, somatically based, underlying the drives." The days of usefulness of Freud's terminology will be numbered when we can pinpoint the origin of the forces and control them, he said.
- To prevent compartmentalization of knowledge, all members of the orthopsychiatric team should be acquainted with the structure, physiology, and chemistry of the brain. The extent of training would vary with an individual's specialty and need to know.
- Basic scientists should work as part of the orthopsychiatric team, at least for brief periods of time. All would learn from each other and true interdisciplinary research would be effected.
- Contributions by specialists in orthopsychiatric fields should continue at a high level, avoiding a low common denominator and guarding the interdisciplinary functioning.
- New explorations and speculations must be encouraged. Observational abilities should be cultivated to evaluate new directions, choosing those with promise and putting aside those that appear fruitless.

Finds Therapeutic Milieu A Complex of Variables

Dr. Fritz Redl, National Institute of Mental Health, Public Health Service, reviewed the concept of the patient's milieu as a factor in psychotherapy.

Confusion in the early concepts has led many people into the trap of seeking "the" therapeutic milieu, he said. It is not possible to determine whether a milieu is in itself good or bad or truly therapeutic on the basis of our philosophical, ethical, or political convictions, or our "taste buds." Those who adhere to the concept of total milieu therapy also need to remain cognizant of the fact that elements of the milieu are not equally important or constantly relevant in all situations. In some situations, for instance, the "pecking order," which determines the position of power, is operable; in other situations, it is not. "The thing that counts," Redl asserted, "is not only the description of a variable, but the assessment of the potential impact on the treatment process of a given group of patients."

It is naive, he went on to say, to think that the discovery of a needed milieu "would automatically make it easy to produce that style of milieu in a given place."

The adjective "therapeutic" he mentioned as another trap, and listed seven common meanings of therapeutic to be found in scientific writings. Therapeutic might mean, for example, "don't put poison in their soup," a translation of "the demand for absence of crude forms of punishment in a place that calls itself a residential treatment center." It might also mean, "you still have to feed them," the implication of the belief that children must have an activity program even though the plan of therapy is not concerned with play or diet.

"Milieu" is also a difficult word to define, Redl pointed out. He briefly outlined some of the factors that would be clinically relevant to therapeutic goals, choices in techniques, and assets or liabilities in various phases of therapy. Among these factors would be:

1. Social structure, comprising the type of hospital ward; the distribution of adult roles, in order that patients may be clear about who may make what decisions; the pecking order among the patients; and the communication network that enables the patient to know who can be approached to listen to certain problems.

2. "The value system that oozes out of our pores," for patients can "smell" what a staff feels, regardless of what it says.

3. The routines, rituals, and other behavioral regulations that have an impact upon the ability of the individual to maintain self-control.

4. Group relationships with respect to scapegoats, mascots, cliques, role playing, mob psychology, leadership tensions, and other such forces that demand more concern than "the curious stares of an anthropological slumming party."

5. Personality peculiarities that a patient "swings around his body like a wet towel hitting whoever gets in its path, innocent or not." Personality traits are "real things that hit and scratch if you get in their way."

6. The staff's attitudes and feelings that actually have an impact on the clinic situation.

7. The behavioral output by others to which a patient is exposed, and

which is distinct from the underlying feelings out of which people act.

8. Activities patients are requested to perform and the performance required of them ("constituent performances").

9. Space, equipment, time, and props: the space the patients work in, the time permitted for various activities, the medical and other equipment, and other "properties" of a clinical setup.

10. "The seepage from the world outside": the impact of visitors, the "sociological body odor" of the old neighborhood the patient may see in being transported from one place to another, excursions, movies, television shows, all the things that impinge upon and break open the institutional setting.

11. The "traffic" regulations of social interactions that normal life leaves to a person's own resources, and the "umpiring" services that may or may not be provided to protect a patient from specific experiences or to interpret certain experiences for him.

12. The "thermostat" for regulating the behavior of patients according to their needs during different phases of treatment. (Behavorial ceilings must be lowered when impulse-panic looms and raised when self-imposed internal pressures mount.)

In the face of so many complex variables, Redl proposed that the clinician isolate ingredients in the milieu as they affect patients in a specific setting during a specific activity. If the clinician knows the actual experience that a concrete situation has produced in a patient as well as what the patient did with the experience, then "milieu" will make more sense, Redl said.

Drift Theory Inadequate, Investigation Reveals

Investigation of the hypothesis that schizophrenics tend to drift into socioeconomically lower sections of a city was reported by Dr. Robert Plank of the Veterans Administration in Cleveland, Ohio.

Four major hypotheses have been offered in the past to explain why schizophrenics are consistently admitted into hospitals in larger numbers from socioeconomically low central districts:

- Statistical artifacts may have clouded the true proportion.
- In certain neighborhoods, schizophrenics are more likely to get into difficulties and therefore to be noticed. This is called the visibility hypothesis.
- The drift hypothesis.
- The breeder hypothesis, which assumes that the type of neighborhood is causally related to schizophrenia, so that by living in certain neighborhoods some people are more apt to develop schizophrenia.

Plank observed that the last two hypotheses are now receiving the most attention.

For his study, Plank selected active cases of schizophrenia at a Veterans Administration mental hygiene clinic. They were white, male, and veterans of World War II. The reasons he gave for selecting this group were: (*a*) whites have more freedom of residential mobility than nonwhites; (*b*) men have different residential patterns from women and also there were fewer women; and (*c*) veterans of World War II provide men of similar ages for experimental and control groups.

The number of veterans in both groups was 32, for a total of 64 in the study. Their present place of residence was compared with their residence at the time of induction into military service. Plank concluded that there was no evidence that these schizophrenics had tended to drift into lower neighborhoods, "but it is shown that they tend to stand still on the residential level on which they are while other people move upward."

The effect of marriage status was next examined, and Plank found that those who were single at induction but were now married had tended to move upward. For the others, there was a balanced upward and downward movement.

When living arrangements were compared, results were similar to those on marital status. Men living with parents or someone in place of parents at the time of induction, but were no longer, showed an upward tendency. The others were about balanced.

"In considering these figures in conjunction with individual case histories," Plank stated, "we find several patterns clearly emerging. The prevailing pattern is marked by two concerted steps in young adulthood: marriage and emancipation from parental figures. This involves a change in living arrangements which in our culture often opens the way to a residential upward movement. The typical schizophrenic patterns are characterized by the absence of these elements. . . . The new element that recent ecologic research has introduced is that we now have evidence that these patterns account for the relative drift."

We have to consider, Plank concluded, that while studies such as these help us understand the rationale of the drift hypothesis, a similar job is also being done for the breeder hypothesis. Understanding and, eventually, better control of schizophrenia through ecology would be forthcoming "if we were in a better position to see the dynamics by which a type of neighborhood can foster the development of schizophrenia in individuals who live there," he said.

Recovery Ratio Is High For Untreated Applicants

What do families do when they apply to a child guidance clinic for help but cannot be accepted? This question was posed by Sylvia Fowler, chief psychiatric social worker, Reiss-Davis Clinic for Child Guidance, Los Angeles, Calif., and Mary B. Novick, lecturer, School of Social Welfare, University of California, Los Angeles.

At the Reiss-Davis Clinic, where this study was conducted, less than a third of the applicants for treatment could be accommodated. In a 6-month period, 383 applicants were referred elsewhere. Of these, 145 were selected for followup, with 107

persons reached by questionnaires or by telephone and personal interviews.

Answers revealed that 46 percent had obtained treatment and 54 percent had not. Of those treated, 75 percent obtained treatment from one of the community's resources suggested by Reiss-Davis. The other 25 percent obtained treatment on their own initiative from other resources. Of those who had not obtained treatment, approximately 25 percent each made no further attempt to find help, contacted suggested sources but abandoned all efforts when refused further, did not try these sources but tried others before giving up, and last, tried many sources, those suggested as well as others, but failed to obtain treatment.

"The reason most frequently given for the inability to obtain treatment by those who made further effort," Fowler and Novick commented, "was that the other community resources also could not provide service within a relatively short time."

One important finding, the authors stated, was that almost 45 percent of those who had not obtained treatment felt that the problem was either solved or conditions had improved to the point where professional help was unnecessary. The authors speculated on the reason for this, but observed that their study could not prove, for example, that the mere interest in treatment the parents had shown resulted in some improvement, or that the conditions had changed.

"If further studies could establish that improvement without treatment could be predicted in certain delineated situations or at specific maturational phases, what a boon this would be for all who work with troubled people," they said. Criteria would then exist to permit the selection of those "who must be treated and those who could be kept off waiting lists."

Recognition of parental frustration in these matters led Fowler and Novick to a thoughtful consideration of a clinic's relationship to those who, for the first time, seek help. The authors recommend the following:

"Procedures in clinics for telephone interviewing should be developed so that everyone engaged in this important public relations function will act with sensitivity and thoughtfulness when talking to a troubled parent who may be faced with a discouraging number of rejections from other community facilities.

"It is important to realize that a parent's application to a clinic may be his first step toward achieving a better adjustment, whether treatment does or does not ensue. If an agency mishandles this first contact, the parent may become immobilized or even regressed, thereby impairing his ability to deal with his problem. If, on the other hand, every member of the clinic staff is aware of the therapeutic value of every contact, then these contacts can be made constructive experiences for the parent, mobilizing his strength to obtain treatment or to handle his situation better.

"Some parents cannot afford to take time off from work to accept treatment offered during regular hours. Clinics should consider the feasibility of adding Saturday or evening hours for marginal income families whose financial stability would be jeopardized if the parent must have weekly sessions during the working day."

Treatment Not Significant In Child Adjustment

An evaluative followup study, conducted by Dr. Eugene E. Levitt, Indiana University Medical Center, and Dr. Helen R. Beiser and Dr. Raymond E. Robertson, Illinois Institute for Juvenile Research, revealed no significant differences in adjustment between psychotherapeutically treated and untreated child patients.

The purpose of the study was to evaluate the effect of psychotherapy at the Institute for Juvenile Research, an agency of the Illinois State Department of Welfare.

For their study, adjustment was defined on the basis of 26 variables; followup meant 5 to 6 years on the average after the case was closed; and a treated case was one in which at least one member of a family had a minimum of ten 1-hour therapeutic interviews.

Four methods of obtaining a control group were examined and rejected by the authors:

1. Use of patients discharged from State hospitals, because persons in hospitals are usually more disturbed than those in clinic or outpatient groups, and the criteria for discharge are not well defined.

2. Correlational analyses based on certain hypotheses, such as improvement as a function of the number of treatment interviews instead of an actual control group, because results may be equivocal.

3. Use of cases diagnostically eliminated from treatment, because the groups would differ importantly with regard to prognosis.

4. Use of alternate cases in the same group for treatment and control, because the clinic cannot ask the control group to wait too long for treatment. Some will seek therapy elsewhere, and evaluation could only be made at close of treatment and not at followup.

A fifth procedure, and the one accepted for this study, is to use "defectors" for the control group. Defectors are persons accepted for treatment but who fail to undergo treatment.

A sample of 1,006 cases was randomly selected from among treated (experimental) and untreated (control) cases. A total of 327 experimental and 142 control cases actually participated in the first stages of the study. The experimental group number was further reduced to 192 cases, when the qualification of at least ten 1-hour treatment interviews was introduced as a factor in selection.

A study of the experimental and control groups revealed no significant differences in adjustment between the two groups, the authors stated, but mentioned a few conditions upon which this estimate was based.

First of all, the conditions under which the study was made refer specifically to those prevalent at the Illinois Institute for Juvenile Re-

search. Second, almost half of the individuals treated were in the hands of relatively inexperienced personnel (students or those with less than 1 year of experience). Third, 34 percent of the patients were treated by more than one therapist, and 90 percent had been seen only once a week.

The authors concluded that the results of the study are due in some part to less than optimal conditions of therapy. "However," they added, "the data themselves do not bear directly on this hypothesis."

Behavior a Function Of Person and Setting

Contributions to mental health and psychological therapy would be more significant if the psychological aspects of environmental factors were classified and quantified along with the "internal" variables of personality, suggested Dr. Harold Raush, Child Research Branch, National Institute of Mental Health, Public Health Service.

Although the investigator is faced with difficulty in defining situations, it can be shown that the particular setting affects the kind of behavior that one sees, Raush said. He indicated that such considerations have implications for problems of diagnosis and psychotherapy. One simple illustration, Raush observed, was that two members of a staff might disagree about the improvement of a patient depending upon where they observed his behavior.

"People exist, behave, fantasy, and think in specific environments, and conversely, for psychology at least, situations exist only in the sense that they impinge on specific organisms," he said. We can predict something about behavior when we know the person involved, and we can predict something about behavior when we know the kind of situation, but, he added, there remains the issue of interconnections between persons and situations. Persons and situations do not work additively in their contribution to behavior, Raush noted. Thus, the ability to gauge the direction of behavior is enhanced far beyond an additive function when one's focus is on the interaction between person and situation.

Raush raised the point that two patients could react to the same psychological features of a situation in different ways or "scan the same situation for different features." This obviously implies that variables of personality cannot be played down while one is considering the variables of a situation. "It is at the juncture of these two classes of variables that we meet behavior," he concluded, "and it is the study of this juncture that I should like to emphasize."

Public Health Nurses Promote Mental Health

Public health nurses are a potent resource in the promotion of mental health, commented Dr. Hildegard E. Peplau, associate professor of nursing and director of the program in advanced psychiatric nursing at the Newark College of Nursing of Rutgers University.

Informing the lay public and obtaining its moral and financial support are activities in which the public health nurse has proved herself particularly able, Peplau said. The capabilities of the public health nurse along these lines, she added, are in direct proportion to the confidence and respect she has won through her constant endeavors in the public's interest.

Of particular importance to the promotion of mental health, she said, is the public health nurse's skill and understanding. In times of family crises as well as at those times when a sustained, sympathetic relationship is called for, the public health nurse is prepared to provide support, information, and counsel for the anxious people she may serve.

The public health nurse is also in a strategic position to offset the consequences or to prevent the occurrence of mental illness.

Peplau pointed out that case finding, prompt referral for early treatment, and therapy are routine activities for the nurse and can be easily extended into the field of mental health. In addition, the nurse can bring to the attention of those in need new treatment facilities. She can inform families about the nature and extent of illness in a member of the family, and prepare them for responsible attitudes toward such members when they are returned from hospital care. Lastly, mental health education can be inculcated without difficulty into the public health nurse's normal activities, Peplau said.

Dying Patients Prefer Talking About Death

Two dominant attitudes toward death were discussed by Dr. Herman Feifel of the Veterans Administration Mental Hygiene Clinic, Los Angeles, Calif. One views death in a philosophic vein as the natural end process of life. The other, the religious perception, is that death is really the beginning of a new life and a termination only of physical existence. From these attitudes two contrasting ethics may be derived: a stoic acceptance, or an idealistic glorification of death (or the "afterlife") that gives meaning to the biological cycle.

Feifel offered an interim report of the results of questions about death he asked 85 mental patients with a mean age of 36; 40 aged persons with a mean age of 67; 50 young people, mean age 26; and 35 professionals, mean age 40.

Patients were asked what disease they expected to die from. The majority were unable to associate their prospect of death with a specific disease, but a high proportion of mental patients visualized themselves as dying in a violent accident. Most patients hoped to die quickly and with little suffering.

In response to the question, "If you could do only one more thing before dying, what would you choose?" the mental patients voiced religious or social interests. "Give my belongings to charity . . . stop war if possible . . . know more of God," they said. The young persons and professionals, in contrast, expressed

more personal desires: they wished to travel, live in a new home, and so on.

The religious persons had more personal fear of death than the nonreligious. They expressed concern with purgatory or hell and with their failure to expiate sins, in contrast with the nonreligious who more frequently wished to continue their work in life, provide for their families, finish undertakings, or enjoy their experiences. Even those religious ones who expected to go to heaven were not all free from the fear of death.

Feifel suggested that the fear of death could well be one of the reasons connected with society's rejection of the aged. He also felt that it would be interesting to examine the attitudes toward death of those working in the "life saving" professions.

To deny or ignore death, Feifel said, is to distort life's pattern. Human maturity, he said, entails a recognition of limit. "We are not altogether free in any deed as long as we are commanded by an inescapable will to live. . . . Not until man overcame the fear of death could he permit himself to be bitten voluntarily by a [yellow fever] mosquito, sail to the seven seas, or master the art of flying."

Feifel found that dying patients wished to talk about their feelings and thoughts about death but felt that they were denied the opportunity by those who look after them.

He said a large number of terminal patients prefer honest and plain talk about the seriousness of their illness. "They have a sense of being understood and helped . . . when they can talk about their feelings concerning death. There is truth in the idea that the unknown can be feared more than the most dreaded reality. . . . Patients can accept and integrate information that they are to die in the near future but want a gradual leading-up to this rather than a 'cold shower' technique, as one patient put it."

Feifel said the reaction of the patient to such information depends on his character more than on the event itself. He adds, "The crisis is often not the fact of oncoming death per se . . . but rather the waste of limited years, the unassayed tasks, the locked opportunities, the talents withering in disuse, the avoidable evils which have been done. The tragedy which is underlined is that man dies prematurely and without dignity, that death has not become really 'his own.' "

Consistent Help Needed For Problem Families

Chronic problem families functioning at primitive and regressed levels can be helped if social agency workers maintain consistent relationships with the family over a long period of time rather than at sporadic intervals. Moreover, services provided for the family must be flexible to meet its needs and must be immediately available. Initial emphasis must be on material support.

These were the conclusions presented by Dr. Joan J. Zilbach of the Judge Baker Guidance Center and United Community Services in Boston, Mass., Lester G. Houston, Greater Boston Council for Youth, and Emily C. Faucett, Smith College School for Social Work, reporting on their study of selected families in Roxbury, Boston.

Seven public and private social agencies pooled their resources "to develop more effective methods for reaching and serving chronic problem families," the authors stated.

Criteria for inclusion in the study were: (*a*) repeated contacts with social or law enforcement agencies over a minimum of 3 years, with requests for assistance; (*b*) at least one child in the family under 13 years old; and (*c*) at least one child in the family who had experienced social difficulties.

Eighteen families were selected for study. These families live in urban areas with high rates of social disorganization and delinquency. All had had at least 15 years contact with 10 or more agencies. With so many agencies trying to help them, duplication and ineffectiveness of services and lack of coordination between the agencies were discovered by the researchers.

Children in these families presented numerous problems, running the gamut from physical handicaps to sexual delinquency. Many had been in courts and State institutions of correction. Surprisingly, the authors commented, "only one family had been known to a child guidance clinic."

In many of the families, fathers were elusive or nonexistent. Fathers and mothers came from homes marked by physical handicaps, psychosis, alcoholism, illegitimacy, prostitution, or imprisonment of one or both of the parents.

According to the type of relationship the mothers had with their families and other persons in the community, the families fell into two broad classifications. Mothers in the first group showed strong attachments to their children, often having many. And they resented any efforts of the social worker except the offering of material assistance. Mothers in this group, however, were able to request medical care for their children even when they were unable to do this for themselves.

Mothers in the second group were characterized by apathy and impersonal relations with those around them. Whereas mothers in the first group exacted from their children fulfillment for the deprivations they had suffered themselves in childhood, maintaining ties with their children when they moved away, those in the second group neglected and ignored their children.

These emotionally deprived people, it was observed, "have learned to function in a fragmented way without the ability to move forward from a primitive level." Their needs are difficult to understand, and agencies that merely supply their requests for concrete assistance do not help them towards individuation, independence, and self-support, the authors pointed out.

Social workers must involve themselves in the routine and repetitious crises of chronic problem families, however difficult such a relationship may be—and chronic problem families are "notable for their ability to rout and defeat the hardiest worker." By meeting emotional as well as

material needs, "work with families has become not only more understandable but more fruitful," they observed.

Antisocial Behavior in Boys Traced to Their Mothers

In a study of 20 aggressive, antagonistic, and antisocial boys without fathers, the relationship between mother and son was revealed to be intense, highly sexualized, and full of hostility and guilt.

Reporting on this study were Dr. Howard L. Wylie, assistant director, and Dr. Rafael A. Delgado, psychiatrist, of the Worcester Youth Guidance Center in Massachusetts.

The mothers came to the center under external pressure, usually from school authorities, with the chief complaint that their sons could not be controlled or disciplined. The mothers, it turned out, treated their sons in much the same way they had treated their husbands, and, in most cases, that relationship had been a stormy one, Wylie and Delgado said.

The particular forms of behavior the mothers imposed upon their sons were seductive and punitive, the authors said. In many instances, mothers shared their beds with their sons, bathed them at an age when the boys were quite capable of bathing themselves, wrestled with them, and engaged in other sexually charged, symbolic activities.

Punitive measures, apparently arising from hatred for the former mate, self-derogation, or guilt over the sexual substitution of son for father, were inflicted by many mothers on their sons. "We often have the feeling," the authors said, "that the mothers were driven by an intense need to see their sons behind bars." For some mothers, this seemed to be a protective measure: they feared hereditary incompetence and a consequent emulation of the scorned father by the son. For other mothers, an imprisoned son would be means to a symbolic revenge upon the father.

The boys, reacting to this love-hatred complex, took their revenge through a variety of antisocial activities. Aggressiveness and belligerence were accompanied by enuresis and soiling, and, occasionally, delinquent acts. Several had appeared in courts and three were in corrective institutions, the authors found.

The mothers could not all be delineated in precisely the same terms. Some had found replacements for their husbands and, on the one hand, were adjusting to their situation better, and, on the other, were replacing their sons with psychologically more valid objects for their love. Other mothers were persistent in their substitution of son for father, and still others were "dominated by a vengeful, competitive attitude toward males, and by a strong wish to be a man. These women looked upon their sons as the fulfillment of this wish," the authors averred.

Therapeutically, the situation was not enviable, and the authors said that their attempts to help these people had not been very successful. Most of the mothers rejected the offer of treatment outright or withdrew after a few visits. Most of those who came showed a blatant resistance to treatment. The boys were also seen for only brief periods of time. Those that showed some improvement rapidly relapsed into their former behavior when they returned to their unchanged environment.

Recognizing that the significance of their findings is open to some question, the authors described several limitations that restrict their conclusions and require further investigation: (*a*) some boys with fathers behave similarly to these boys; (*b*) not all boys without fathers behave this way; (*c*) siblings of these antisocial boys may or may not conform to the same behavioral patterns in the same circumstances; and (*d*) the socially antagonistic behavior of the child, so far as it is an extension of the mother's maladjustment, may be transitory if the mother is capable of forming a valid relationship with another man and is in the process of doing so.

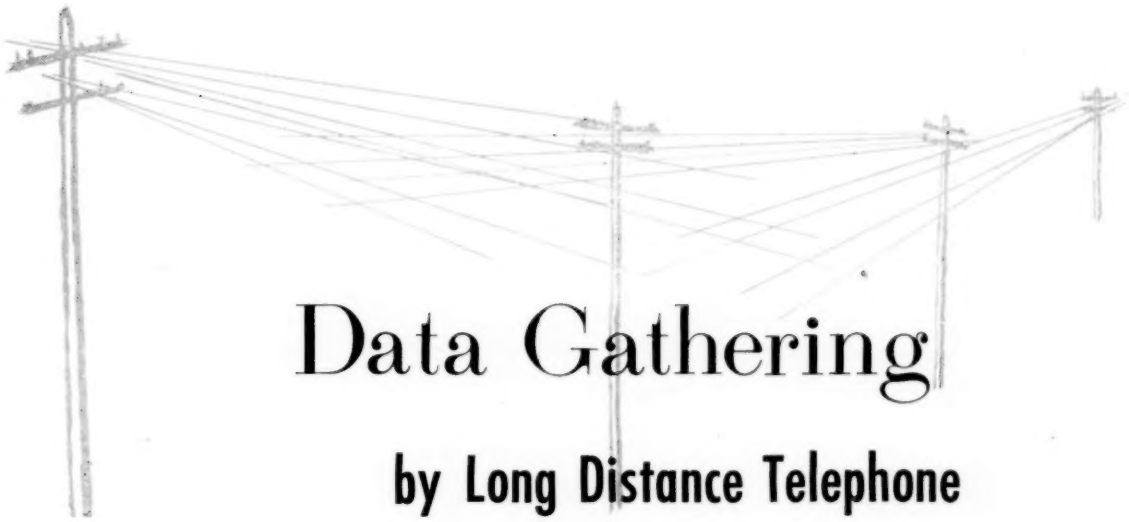
Atomic Radiation Poses Mental Health Hazards

Atomic radiation "is surrounded with an aura of mystery and must be expected to evoke strong emotional reactions," according to Dr. Frank Fremont-Smith, member of the executive board of the World Federation for Mental Health.

Citing an atomic radiation incident in Windscale, England, another in Holland, and a third in Houston, Tex., Fremont-Smith pointed out that each gave rise to anxieties and fears disproportionate to what the factual situation called for. The problem, he said, was primarily a failure in proper communication, both in official and public domains, so that there was a loss of confidence in the responsible authorities.

He referred to present anxieties about X-rays as an analogous situation. With a great deal of publicity directed toward the dangers of X-rays and faulty equipment, a number of people have refused to permit roentgenograms to be taken, even when urgently required for proper diagnosis.

"The mental health problems of the peaceful use of atomic energy are the mental health problems of preventing war," he concluded, "and with the advent of nuclear weapons the problem of preventing war has become the human problem of human survival. The real issue is not the peaceful use of atomic power but the peaceful use of human power."



Data Gathering

by Long Distance Telephone

HILARY G. FRY, Ph.D., and SYLVIA McNAIR

A RESEARCH technique relieving many of the headaches in ordinary data gathering was developed during a recent study by the Hospital Research and Educational Trust. Questionnaires were mailed to a widely scattered group of people who were then interviewed by long-distance telephone. The method proved efficient and effective, and at the same time relatively inexpensive.

The research undertaken was an administrative study of hospital planning and license laws, and the field to be covered was both broad and deep. We were concerned with the administration of the following separate but related State programs in 52 States and Territories: hospital survey and construction (Hill-Burton), hospital licensing, and nursing home licensing. While in some States the three programs were integrated under a single administration, the problems were nonetheless distinct from one program to another. Variation from State to State existed in every phase of the operations—in the legal structure, in the organization, and even in the philosophy underlying the programs. Our objective was to analyze the programs all the way from the enabling legislation to the question of "where do we go from here"; to describe existing conditions and to make recommendations for the future.

As a first step toward acquainting ourselves with the existing programs, our staff members visited seven States in the summer and fall of 1956. We talked with two groups—State officials concerned with the administration of the programs and nongovernmental persons representative of those affected by the programs. Interviews were based on 6 questionnaires containing up to 125 questions. These questions covered the following:

- The law.
- The regulations written under the law, making it more specific.
- The philosophy of the agency: whether its

Dr. Fry was project director, and Mrs. McNair, research assistant, with the Hospital Research and Educational Trust in Chicago. *The article is based on the experience of the authors on project W–42, Operation of Hospital Planning and License Laws, which was supported by a research grant from the Division of Hospital and Medical Facilities, Public Health Service.*

approach is educational or purely regulatory, or a combination of the two.

- The organization and staffing of the agency.
- The operational procedures used in the program.

The information from these visits was invaluable. But their greatest value, perhaps, lay in what they proved we could not do. We found that it would be impossible to draw justifiable conclusions from a sampling of a few "typical" States because of the variations from State to State. There are no typical States. Ideally, we should interview individuals from every State before attempting to prescribe for future action.

Conventional Survey Techniques

The ideal method of gathering the type of information we sought would have been face-to-face interviews with large numbers of persons. Unfortunately, we faced a shortage of the two elements essential for this method: time and money. It is not necessary to belabor these points; most researchers will readily recognize that it would be impossible for a staff of four to visit within a few months several hundred people scattered in various towns and cities in every State. If we could have divided the country into four areas with one staff member covering each, our purpose would not have been accomplished, since our staff members had different specialties and each of them had to interview people in every State. Also, the cost would have been prohibitive on our limited budget. There are, moreover, the inevitable delays caused by difficulties in transportation, missed appointments, and other unpredictable obstacles.

If sampling would not suffice, and face-to-face interviews on a nationwide basis were impossible, would a direct-mail questionnaire produce the desired results? The direct-mail questionnaire is the least expensive and often most efficient method of conducting a survey. The disadvantages, however, are well documented in research literature. Misinterpretation of the questions often leads to inaccurate replies. In addition, written comment is sometimes difficult to classify. An interviewer, on the other hand, can often discover patterns in comment and thereby categorize the replies. About 60 percent response is the maximum expectation from this type of research. It is also far less effective than skillful interviewing for obtaining thoughtful comments in reply to open-end questions.

A questionnaire to solicit information about 52 dissimilar State and Territorial administrations would have to be both general and minutely detailed. Consequently, it would be so lengthy as to be enthusiastically ignored by most respondents.

Since our survey had to include questions requiring thoughtful comment as well as the "yes-no" and "how many" type of question, direct mail would have been a highly inadequate method of obtaining results.

But even more important was the fact that only a limited number of individuals in each State were sufficiently familiar with the programs to give us the information sought. Almost 100 percent response from every State was necessary for our survey to be comprehensive.

Thus an alternative method had to be devised—one that would cover the ground more adequately than either the sampling method or the direct-mail questionnaire, and at the same time cost less in time and money than face-to-face interviews on a nationwide basis.

Long-Distance Telephone Survey

The long-distance telephone call seemed to be the compromise we needed—a means of communication only slightly less direct than face-to-face interviewing and far less expensive. Actually, on analysis of survey results, we found the technique had many positive advantages of its own, but at the start we regarded it as a compromise.

We consulted the telephone company concerning arrangements for the undertaking and were given the following suggestions:

- Installation of special long-distance wires in order to avoid overloading the office switchboard. (There was a slight charge for these lines, but they more than proved their worth in time saved.)
- Use of a special "hands-free" set, consisting of a loud speaker and a microphone. A conventional receiver could be used, but it was

also possible to talk and listen without picking up the receiver. Thus, the interviewer's hands were free for taking notes and handling papers. This device was especially advantageous to us. Many respondents were familiar with more than one of the State programs and made comments pertinent to the work of more than one of our specialists. With the hands-free set, more than one specialist could listen in on the interview.

• Supplying the telephone company with a weekly list of names and addresses of the individuals scheduled for calls, an arrangement called "sequence calling."

The next task was to prepare six separate questionnaires: one each for the Hill-Burton, hospital licensing, and nursing home licensing programs to be answered by government agency people, and another set for nongovernmental people. In an effort to devise questionnaires which would be practical in long-distance calls, we edited, shortened, and combined questions from the detailed surveys made during our visits to the seven States. The final drafts contained from 15 to 24 items each. Every effort was made to write as lucidly and specifically as if the questions were to be answered by mail.

These questions were designed to obtain information on the law, regulations, and philosophy of the program, and on the organization, staffing, and operational procedures of the agency. The basic purpose of the survey was to help us identify the persistent problems in the operation of these programs, for it was on these problems that we planned to concentrate our attention. Hence there were virtually no strictly informational questions included in these questionnaires—no "nose count" on "how many States follow what practice."

The questions, particularly those for the nongovernmental people, were principally opinion-type. These we regarded as basic questions: Did they think the Hill-Burton planning in their State had been well tailored to the needs of the State? What services did they think the State Hill-Burton agency should perform for Hill-Burton hospitals? For other hospitals? How thorough were the inspections of hospitals and nursing homes in the State? Were they thorough enough to insure compliance with minimum standards?

In addition, we included a group of multiple-choice questions on both the present and the ideal program. Such questions covered the role of the advisory council, status of the educational program in the State, techniques for putting the State's Hill-Burton plan into effect, how much "toughness" should be used by the State agency in enforcing minimum operational standards, and others. These questions would tell us not only how much agreement there was on present practices, but whether the governmental and nongovernmental people could conscientiously work toward the same goals.

Before selecting nongovernmental persons to be interviewed, we consulted many State hospital and nursing home associations as to which people in their respective States were most familiar with the programs. The list included representatives of medical, hospital, religious, nursing, and nursing home associations, and, in a few instances, of allied fields such as dentistry and architecture. A high percentage were serving or had at one time served on an advisory council to a State program.

Mimeographed copies of the questionnaires were mailed to these individuals with covering letters explaining our plans and informing the recipients that we expected to telephone during a specified week. The mailing was staggered so that the letters arrived about a week before the call was made. This gave the individuals time to think about the questions and make some preparation for answering, but not time enough to file them away and forget them.

In making up the weekly list for the telephone company, calls were scheduled according to normal working hours in the various time zones. The number of calls planned per day was kept low enough to allow for adequate discussion time and for "writing-up" time following the call.

As each call went through, the operator asked the following type of question. "Are you ready to talk with Mr. Fry of the American Hospital Association about the questionnaire?" If the respondent said "No," she would then try to set up a specified time for the interview. There was no charge for this service.

The respondent followed his own copy of the questionnaire while the interviewer noted the

answers and comments on a duplicate copy. When answers seemed unclear, when it seemed that the respondent did not quite understand the question, or when the question asked did not fit the situation in that State, time was taken for thorough discussion. In some cases this resulted in a change of answer. For example, a few of the questions involved multiple choices representing varying degrees of opinion. After some discussion the respondent might decide that choice "c" was a closer approximation of his true opinion than his original choice of "b."

As each interview ended, the interviewer took time to write up or dictate his notes. These notes were then typed into the questionnaire itself, on pages facing the actual questions. Thus, we obtained a detailed record of the opinions expressed. However, no record was kept in any case where the respondent requested that he not be quoted.

We considered recording the conversations, but decided against it because of the time required to play them back completely, the distracting "beep" that punctures recorded conversation, and the inhibitions that would have precluded frankness from many people.

Using 2 "hands-free" sets in separate offices and sitting in on one another's calls as necessary, our 3 interviewers talked with 281 persons in 48 States and the District of Columbia, gathering responses to 567 questionnaires, in approximately 8 weeks. About 2 percent could not be located or declined to be interviewed.

The total cost of the calls to all the States came to $4,703.17—just under $100 per State, or about $17 per individual interviewed. Of the total amount, $17.05 was the charge for installation, $133.76 the basic cost of the 2 special lines and the 2 speaker phones, and $4,552.36 the charges for the calls including taxes.

Advantages

For this type of research, the advantages of the telephone technique over a direct-mail questionnaire are the same as those gained through the face-to-face interview: the almost total response, the accuracy and depth of the response, and the clarification which facilitates classification. In addition, the telephone interview overcomes one disadvantage of the face-to-face interview: the great expenditure of time and money.

We estimated that for the total of $4,703.17, in the 8 weeks spent in telephoning, we would have been able to visit in person only 10 western States, or about 80 individual respondents. (And this figure does not include the considerably greater payroll expenditure which the longer time span would have entailed.) The cost per person in this event would have been $80, as compared with the $17 actually spent.

Other more subtle advantages of this technique became apparent as we proceeded.

The telephone interviews were far more concentrated and free from both interruption and digression than the usual personal interview, since the awareness of the cost of long-distance telephoning exerted some pressure in this direction on both interviewer and respondent. (In no instance was the conversation interrupted by a phone call!)

Respondents had, for the most part, made more preparation in advance for answering the questions by telephone than is usually made in anticipation of a personal visit. In a number of cases respondents had even held conferences with other staff members or colleagues concerning the questionnaires.

The time between the first and last calls of the survey was less than probably would have elapsed from beginning to end of a direct-mail survey. (We used direct-mail questionnaires on some other phases of our study, and replies dribbled in for months.) The concentration of study on the part of the researchers into a shorter span of time contributes to more uniform evaluation of data, since it lessens the tendency to shift emphasis during the progress of the study.

Respondents' Reaction

The idea of indulging in such long telephone conversations for research purposes is unusual enough to be startling to the persons called. There was, in fact, some slight criticism of the generous outlay of funds in this manner. Although it was easily answered, the researcher who intends to employ this technique would be well advised to avoid such criticism by offering in advance a straightforward explanation of

the method, together with cost comparisons. This is particularly true if the individuals to be interviewed have a stake in the project and feel that they have a right to an opinion regarding expenditure.

In our case, however, the telephone technique was heartily endorsed by our respondents almost unanimously. The interview required less of their time than a personal visit, yet the lengthy long-distance call emphasized the value of their opinions to the study. There was some comment to the effect that respondents' own interest in the subject had been intensified by the conversation, and that they welcomed the opportunity to evaluate and review the programs.

Conditions for Use

The technique obviously has it own positive values which under certain conditions make it preferable to any other. It may well be the method of choice for other studies under the following circumstances:

- A budget large enough to permit more exhaustive research than would be possible through a direct-mail questionnaire.
- Neither time nor money sufficient to permit visiting each respondent personally.
- Widely scattered geographic distribution of the persons to be interviewed.
- Great variation and complexity of questions, making written replies inadequate.
- The impossibility of making valid conclusions without an extremely high percentage of responses.

The long-distance telephone survey is suggested to supplement, not to supplant, other methods of gathering data. Many research projects will still be forced to rely on the mails as the most economical method. Others will require a rapport obtainable only by personal visit; "depth interviews," so popular at present, can hardly be held over the telephone. It is still impossible, and will be until telephones include built-in television, to pick up the shades of meaning implicit in the twinkle of an eye or the shrug of the shoulders unless you are facing your respondent.

But if your budget is sufficient, your time limited, your scope large, and your questions complex, it would be well for you to consider using the telephone as a research tool.

Days of Limited Activity Due to Disability

The total number of days which the American people stayed home from work, stayed in bed, or otherwise restricted their activities because of illness or injury has been estimated at 662,800,000 for July through September 1957, in a report issued by the U. S. National Health Survey of the Public Health Service. The report, which is the fourth in a series based on household interviewing, projects the rate of that quarter for the entire year to give an average of 16 days per person.

As of August 1957, the report estimates that about 17 million persons, or 10 percent of the population, had chronic conditions limiting their activities. Women and girls averaged 17.5 days of limited activity per year, compared with 14.1 for males. Children under 5 years of age averaged 6.4 days a year of restricted activity, while people 65 years and over averaged 44.4 days. The average time lost from work was estimated at 7.9 days for each employed person.

Method of Stabilizing Antigen Emulsion Used In VDRL Syphilis Tests

HILFRED N. BOSSAK, B.S., and
WILLIAM P. DUNCAN, B.S.

ONE of the most important factors contributing to reproducibility of flocculation tests for syphilis is the ability to prepare antigen emulsions of uniform reactivity. Deviation from prescribed methods, use of reagents of poor quality, unclean glassware, and temperature variants may result in antigen emulsions of substandard reactivity.

The most widely used microflocculation tests employing cardiolipin antigen, described in the 1955 Manual of Serologic Tests for Syphilis (*1*), limit the use of antigen suspensions to the day on which they are prepared, or, as in the Kline standard test, to 48 hours.

A method whereby antigen emulsions of standard reactivity might be preserved for use in these tests would appear to be a valuable aid in promoting uniformity of test performance by eliminating the necessity of preparing them each day tests are performed, thus permitting their storage, shipment, and use over relatively long periods of time.

Antigen emulsions preserved for varying periods of time by the addition of preservatives or by storage at low temperatures have been used in other procedures. Hinton glycerinated indicator (*1*) can be used for at least 3 weeks when stored in the refrigerator. Chediak (*2*) added benzoic acid or beef albumin to cholesterolized alcoholic extracts of beef heart used to preserve emulsions in a microflocculation test on whole blood. Kurtz and Hill (*3*) extended the use of a Kahn antigen emulsion to 36 hours by centrifugation and resuspension of the sediment in 0.9 percent saline. Modified antigen emulsions used by Rappaport and Eichhorn (*4*, *5*) for several microflocculation tests were satisfactory for use for 2 weeks when stored on ice, and Portnoy and co-workers (*6*) modified VDRL antigen emulsion by centrifugation and the addition of choline chloride for use in a screening procedure and found that it could be used for 1 week if 0.01 percent merthiolate was added.

Investigative studies were undertaken at the Venereal Disease Research Laboratory to determine whether some of these reagents or procedures could be applied to the stabilization of antigen emulsions for the most widely used microflocculation procedures, such as the VDRL, Kline, and Mazzini tests, without affecting standard test reactivity level.

This report describes a method employing benzoic acid in the preparation of a stable antigen emulsion of standard reactivity for use in the VDRL slide, tube, and spinal fluid tests. Stabilized antigen emulsions prepared in this manner retained their standard level of reactivity during shipment and long storage periods, thus eliminating the necessity of preparing fresh antigen emulsions each day tests were performed.

Materials and Method

A stock 1.0 percent alcoholic solution of benzoic acid was prepared by dissolving 1 gm. of benzoic acid, reagent grade, in 100 ml. of absolute ethyl alcohol. This solution was stored in a glass-stoppered flask at 6°–10° C., and was satisfactory for use indefinitely.

VDRL antigen emulsion was prepared in 10.0 ml. volumes as described in the published method (*1*). To each 10.0 ml. volume of freshly prepared material, 0.1 ml. of stock 1.0 percent benzoic acid solution was added so that the final concentration of stabilizing substance was 0.01 percent. Each aliquot of this stabilized antigen emulsion was tested with control serums, and all those of standard reactivity were pooled. The pool was dispensed in convenient volumes of 5.0 ml. or 10.0 ml. into screw-capped vials.

The authors are bacteriologists with the Venereal Disease Research Laboratory, Venereal Disease Branch, Communicable Disease Center, Public Health Service, Chamblee, Ga. *Technical assistance in this study was provided by Marjorie A. Lantz, a medical technician at the laboratory.*

In Routine Use

Stabilized antigen emulsion is now used at the Venereal Disease Research Laboratory in the routine performance of the VDRL slide, tube, and spinal fluid tests. A volume of antigen emulsion sufficient for approximately 1 week's testing is prepared and stored in the refrigerator at 6°–10° C. An aliquot sufficient for 1 day's testing is removed from the stock bottle, warmed to room temperature, and then checked with control serums for standard reactivity before use in testing individual serums. A new aliquot from the refrigerator is used each day.

—AD HARRIS, *Director,*
Venereal Disease Research Laboratory.

Four of these vials were stored at 37° C., and one vial was tested each week for 4 weeks. The remaining vials were divided into two groups. One group was stored at room temperature (23°–29° C.); the other was stored in the refrigerator at 6°–10° C. Samples of antigen from each group were tested periodically in comparison with an emulsion of standard reactivity, freshly prepared on the day of testing. A vial of stabilized antigen emulsion was used for at least 1 week if it retained its standard level of reactivity for that period of time. Antigen emulsions stored at 6°–10° C. were allowed to stand at room temperature for at least 30 minutes before use. When testing was completed they were returned to the refrigerator.

Samples of stabilized emulsions also were sent through the mail and, after 3 days in transit, were returned to the laboratory and tested for a period of 7 consecutive days when stored at 6°–10° C.

Results

The keeping qualities of the stabilized antigen emulsions prepared and handled as described are summarized in the table.

The stabilized antigen emulsions were satisfactory for use for 7 consecutive days after storage at 6°–10° C. for periods of 4 to 6 weeks. In one instance, an unopened vial was refrigerated for 4 months and found to be of standard reactivity when tested.

The stabilized antigen emulsions stored continuously at room temperature also retained their standard level of reactivity for relatively long periods, although storage at 23°–29° C. was not as satisfactory as refrigerated storage. Emulsions were satisfactory for use for periods varying between 2 and 4 weeks. Deterioration tended to occur more rapidly as temperatures exceeded these limits.

Emulsions were stored at 37° C. in order to determine the effect of the highest probable temperatures to which they would be exposed during shipment. When stored at this temperature in the incubator, they were found to be of standard reactivity after 2 weeks; however, slight but definite loss in reactivity was noted after 4 weeks' incubation.

The mailed specimens showed no change in reactivity during a period of 7 consecutive days of testing.

Comparative VDRL slide tests were also performed with stabilized and freshly prepared antigen emulsions (duplicates of each) on 570 serums selected at random from specimens submitted to this laboratory for testing. Stabilized emulsions were stored from 1 to 6 weeks at 6°–10° C. before use. Discrepancies in results obtained between the stabilized and freshly prepared antigen emulsions were not more numerous than those obtained with duplicate, freshly prepared antigen emulsions. In all instances, disagreements represented critical, borderline reactions, where the results might have been read either as rough nonreactors or as minimal weak reactors. Stabilized

Effect of storage time and temperature on reactivity of stabilized VDRL emulsions

Storage method	Period of storage (weeks)					
	1	2	3	4	5	6
Refrigerator (6°–10° C.)	SR	SR	SR	SR	SR	SR
Room temperature (23°–29° C.)	SR	SR	SR	SR	LR	----
Incubator (37° C.)	----	SR	----	LR	----	----
Mailed (3 days in transit)	[1] SR	----	----	----	----	----

[1] Not tested beyond 7 consecutive days.

SR—standard reactivity; LR—less reactive than standard.

emulsions were found to be equally satisfactory for use in the VDRL tube flocculation tests with serums and the VDRL tests with spinal fluid.

The use of benzoic acid as a stabilizing substance therefore did not appear to affect the reactivity level of the antigen emulsion for any of these three tests.

Discussion

During the course of these studies, other preserving substances and factors which might affect the relative stability of antigen suspensions were investigated. The presence of alcohol in these suspensions and its possible effect on their stability were considered, since it has been observed that in some instances emulsions containing no alcohol deteriorate less rapidly than those containing alcohol. Alcohol was removed from VDRL antigen emulsions by dialysis, or by centrifugation at 20,000 × g. and resuspension of the sediment in VDRL buffered saline. Both methods, however, resulted in preparations that were less reactive than standard.

The use of proteins as stabilizing substances for colloids and oil-in-water emulsions is well known. Bovine albumin in varying concentrations was added to VDRL emulsions, but in all instances these preparations were undersensitive and showed evidence of contamination after 1 week's storage at 6°–10° C.

Glycerin, too, is a substance commonly used to stabilize emulsions by decreasing surface tension. In addition, as previously indicated, it is used in the preparation of Hinton glycerinated indicator which can be used for 3 weeks. Addition of glycerin to VDRL emulsions, however, either affected their standard reactivity level, or, when used in low concentration, did not preserve them for any significant period of time.

The use of various salts of the fatty acids, such as the stearates, oleates, and palmitates, was also considered. None of these substances, however, was available as a reagent grade chemical readily soluble in either water or alcohol; they were therefore not used.

Of all the substances tested, benzoic acid proved to be the most satisfactory for stabilizing VDRL antigen emulsions. It was readily available as a reagent grade chemical, a 1.0 percent stock solution was stored and used for long periods of time without deterioration, and an extremely low concentration (0.01 percent) was effective in preserving the standard reactivity level of the emulsions for long periods of time.

Preliminary studies have also been carried out using benzoic acid as a stabilizing substance for preserving the standard reactivity of antigen suspensions used in the Kline standard and Mazzini microflocculation tests. Results obtained with both these procedures will be reported later.

Summary

A procedure employing benzoic acid as a stabilizing substance for preserving the reactivity level of antigen emulsions for use in the VDRL tests is described.

The reactivity of the stabilized emulsions varied according to the temperature at which they were stored and the length of time they were kept.

Comparative results obtained on 570 serums tested with freshly prepared and with stabilized emulsions in the VDRL slide test indicated that benzoic acid does not affect reactivity, levels.

Of several stabilizing substances tested, benzoic acid was the most satisfactory.

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Silicosis, a Continuing Problem

VICTORIA M. TRASKO, A.B.

THE CONTINUANCE of silicosis in the United States reflects the cumulative effect on society of a preventable but still prevalent occupational disease. After more than 35 years of definitive research and almost as many years of application of controls in some measure, hazardous exposures still exist and new cases of silicosis are developing. The major impact of the disease today, however, is manifested as a socioeconomic problem.

To view the present state of the silicosis problem in proper perspective, I should like to mention some of the past developments that have bearing on the situation today.

Early Knowledge of Silicosis

Prior to the 20th century, the only intimation of silicosis in the United States was found occasionally in physicians' reports of lung diseases with a suspected occupational involvement (*1*). For instance, in 1887 an autopsy report on a stove foundry worker in Poughkeepsie, N. Y., described the cause of death as the condition that we know today as silicosis. Also in that year, a report appeared on 40 workers employed 25 years or more in a cutlery factory. Of the 34 men who had contracted what was referred to as a chronic disease of the air passages, 23 had died within the previous 10 years. A third report, which came out about 1900 in Utah, told of 30 men who had died following 1 to 2 years' exposure to dust from crushing quartzite ore in a gold assaying mill in Nevada. The description of findings resembled very closely the characteristics of silicosis.

Entering the 20th century, we find a slow, steady awakening of interest in the health problems of dusty trades. The mechanization of certain stone and mining operations and, in particular, the introduction of pneumatic tools which generated substantial amounts of fine dust contributed to the rising incidence of silicosis and its complicating companion disease, tuberculosis. Evidence of excessive mortality from tuberculosis and relationship to dust exposure began to mount, as reflected in the occupational mortality statistics compiled by Dr. F. L. Hoffman of the Prudential Life Insurance Co. in 1907 and 1918 (*1*).

Concern over the large incidence of tuberculosis in the dusty trades gave rise to the first real investigation of the problem. The study was undertaken in 1913–15 in the lead and zinc mining industry around Joplin, Mo., by the Public Health Service and the Bureau of Mines (*2*). Of 720 lead and zinc miners examined, 45.7 percent were found to have silicosis and another 14.3 percent, silicosis complicated with tuberculosis.

Between 1920 and 1930, other environmental and clinical investigations of workers in dusty operations followed. Among these, an examination was made in 1920 by local physicians of 427 granite cutters in Barre, Vt. (*1*). Practically all of the group were found to have silicosis or tuberculosis alone or in combination. During 1924–26, the Public Health Service, in its study of the Vermont granite industry, found that practically all workers exposed to high concentrations of the dust developed the disease and that a large proportion eventually became tuberculous (*3*).

Miss Trasko is program adviser, Occupational Health Program, Bureau of State Services, Public Health Service, Cincinnati, Ohio. *This article is based upon a paper presented at the ninth annual meeting of the McIntyre Research Foundation, Toronto, Canada, January 28, 1958.*

A 1928 study by the New York Department of Labor revealed that 57 percent of 208 workers engaged in rock tunneling in New York had silicosis (*4*). Similar studies and investigations by various groups were carried out in metal grinding, abrasives grinding, porcelain enameling, and in the sandstone and cement industries. In operations where a dust exposure was evident, incidence of silicosis ranged as high as 67 percent. Studies of this type continued into the 1930's, providing ample evidence of the severity of the dust hazard in certain industries and the dire need for dust control measures.

Developments of the 1930's

Despite the steady buildup of incriminating information, not until the 1930's was silicosis generally recognized as a serious occupational health hazard. The awakening was precipitated by a tidal wave of lawsuits in civil courts based both on legitimate and spurious claims of dust disease due to the occupation. Had these claims prevailed, it is alleged, many of the affected industries and insurance companies would have gone bankrupt. In 1933, alone, it was estimated that damage suits of more than $100 million were outstanding (*5*). The grounds for lawsuits were negligence of the employers, since at that time only six States, by so interpreting the term "personal injury," could compensate for silicosis under their laws.

Several factors undoubtedly contributed to this wave of lawsuits. For one thing, a sufficient number of years had elapsed to build up a sizable silicotic population. For another, the Nation had been plunged into an economic depression and silicotic workers were seeking some form of financial compensation for their illness. Another probable reason was the impact of the lag in the application of dust control techniques already developed through scientific research. The lawsuits disclosed that the knowledge of these was not widespread. Employers claimed that they had not been fully informed or warned of the special dangers of certain dusts and, therefore, exercised only general care in prevention which they thought was adequate.

Among other widely publicized events of the 1930's was the Gauley Bridge disaster in West Virginia. Congressional hearings held in 1936 revealed that 476 workers died from silicosis and 1,500 others were suffering from the disease they contracted while digging a rock tunnel for diverting water to a hydroelectric plant during 1932–34 (*6*). No safeguards of any kind were used to control the exposures to rock dust, which was almost pure silica.

Working and living conditions among lead and zinc miners in the Joplin, Mo., area continued to be publicized by commentators and writers. Among these was Dr. Alice Hamilton with her article A Mid-American Tragedy (*7*), published some 25 years after the first silicosis investigation was made in the Joplin area. In Massachusetts and New York, commissions were appointed to investigate hazardous conditions in foundries, granite sheds, and other dusty industries.

These and other events of the 1930's catapulted silicosis from relative obscurity into widespread notoriety and spurred the taking of long awaited action. For example, nine States passed legislation bringing silicosis under the compensation laws between 1933 and 1939. By 1949, the number of States making some legal provision for compensation of silicosis reached 40. The First Saranac Laboratory Symposium on Silicosis was held in 1934, and the National Conference on Silicosis in 1936.

Only three States, Ohio, New York, and Connecticut, had industrial hygiene programs prior to 1934, but with the help of Social Security funds, 26 State and city governments established industrial hygiene programs from 1936 to 1939. Several insurance companies also instituted activities for the prevention and control of occupational diseases for the employers they insured.

In a less dramatic vein, industry began the task of controlling and eliminating hazardous dust conditions. The high degree of success achieved by these efforts is unquestionable. One instance is exemplified in the recent follow-up study of the Vermont granite industry by the Public Health Service and the Vermont Industrial Hygiene Division. Dust counts were found within recommended limits and no evidence of silicosis was detected among men

X-rayed periodically who were initially exposed after the installation of dust controls from 1937 to 1939 (*8*).

The transition to dust control, however, was not as universal or as rapid as some like to believe. During the war years, 1941 to 1945, ventilation equipment was scarce and was released on a priority basis, mainly to war production industries. Studies in Georgia, for example, revealed that as late as 1948 some granite sheds and quarries had silica exposures many times in excess of recommended limits (*9*).

The job of educating the smaller employers in preventive techniques was far from complete. As late as 1953 a death from acute silicosis, confirmed by histological examination, occurred in one of the States. The worker, 24 years old, had had 5 years of exposure in a small plant making cleansing powder which was 100 percent pure "flour of silica." The 18 dust samples collected by industrial hygiene personnel were all above 16 million particles per cubic foot of air, with counts reaching 770 million particles. The owner had no idea of the hazardous nature of his business and had taken no preventive measures. After official investigation, the plant was closed.

Since the war years, many research advancements have been made which in retrospect have been helpful in shedding more light on the epidemiology of dust diseases. The impression of the late 1930's carried into the 1940's, that the dust problem was largely solved, was on the wane by the 1950's. New uses of silica and its byproducts (*10*), more widespread mechanization of dusty operations, and technological advances gave rise to the suspicion that possibly new types of exposures were occurring.

The present-day concern with silicosis as a continuing problem led in 1956 to a series of Congressional hearings on safety and health in metal mines (*11*). This is the second time that Congressional hearings have focused primarily on silicosis as an occupational health hazard.

Prevalence of Silicosis in the United States

Despite all the interest, research, and activity since the 1930's, the precise prevalence of dust diseases remains a mystery. In 1933, Lanza and Vane presented a paper entitled "Prevalence of Silicosis in the General Population and Its Effects Upon the Incidence of Tuberculosis" (*12*). The status of the disease was disclosed in the first four sentences of the paper. "I wish to make it perfectly clear that there is little in this paper to justify its ambitious title. Silicosis is not a reportable disease. It is still commonly not diagnosed. Even in districts where it prevails, it does not appear on death certificates to the extent which one might expect."

On the basis of various investigations, the authors estimated conservatively that 500,000 workers were then exposed to a harmful degree of silica dust in the United States. Various other estimates, including the projected figures of the Public Health Service (*13*), established a total silica-exposed population of between 1,500,000 and 2,000,000. Cummings, at the Fourth Saranac Laboratory Symposium on Silicosis in 1939, ventured a guess that about 50,000 employed workers at that time might be found with definite evidence of silicosis (*14*).

On the assumption that these estimates are valid, the outlook for silicosis as a continuing problem is rather foreboding. Taking the 1933 estimate of 500,000 harmfully exposed workers and applying the then prevalent ratio, of 1 out of every 4 exposed as eventually developing the disease, we arrive at a figure of 125,000 potential silicotics. Even Cummings' guess of 50,000 workers with silicosis in 1939 would impose on today's society a burdensome residue of persons who had acquired silicosis earlier.

In 1955, because of numerous requests for statistics and the mounting reinterest in silicosis, the Occupational Health Program of the Public Health Service began a search for prevalence data in the States. I shall refer only briefly to the results of this study, published in 1956 (*15*).

By putting together the piecemeal information obtained from official agencies, we arrived at a total of 10,362 cases of silicosis on record in 22 States between 1950 and 1954. They included open and settled compensation cases, cases discovered through X-ray examination of workers in dusty trades, reports by physicians, and some death records. Since then we have added to this total, so that we now have some information on 12,763 cases in 26 States, cover-

ing from 2 to 6 years of records between 1950 and 1955.

When we began our inquiries, we were aware of the impracticability of developing conclusive evidence. But, by accumulating data on a sufficiently large number of cases, we hoped to come up with some general answers.

We found that, in addition to the present silicotic population being sizable, it is primarily an elderly one. Only 2.5 percent of the cases are under 35 years of age; 21 percent are between 35 and 49 years; and the remaining three-fourths, 50 years and over. Since most of our data are for compensable cases representing primarily a disabled group, this distribution may be biased. Records of workers with nondisabling silicosis are scarce, as the disease is under-reported, and very few States compensate for partial disability from it. When partial disability is compensable the proportion of cases of persons under 50 years of age tends to be higher. In West Virginia, for example, it was 35 percent and in New Jersey 55 percent. In States compensating for total disability only, such as Montana and New York, 4 and 15 percent respectively of the cases involved workers under 50 years of age.

The mining industries, coal, metal, and nonmetal mining and quarrying, were associated with two-thirds of the cases. Of the manufacturing industries, foundries were associated with 16 percent, and pottery, stone, silica-brick, tile, clay, and glass industries with the remaining 18 percent.

The age distribution by industry showed in each group some cases among men under 35 years of age. However, none of the case totals for the under 35-year-old group exceeded 5 to 9 percent of the industry's total cases. The 50- to 64-year-old group accounted for most cases within each industry as well as for all industries combined.

Another revealing fact was the number of new cases among workers entering dusty trades for the first time since 1935. Of 3,455 cases in 10 States for whom reasonably adequate employment histories were obtained, 10 percent allegedly received their entire dust exposure after 1935. The distribution of these cases by industry shows every group produced at least a few, but that the mining industries, foundries, and nonmetallic mineral industries were responsible for over one-half of the recent cases.

Our data on pulmonary tuberculosis as a complication of silicosis are not satisfactory since not all States record or tabulate the condition. This is especially true for compensation cases, despite the fact that tuberculosis accounts for most of the disability. Proportions of silicosis cases with tuberculosis reported in a few States are: 34 percent of 111 litigated cases in California; 30 percent of 637 open and closed compensation cases in Ohio; 62 percent of 507 hospital clinic cases and deaths in Missouri; 53 percent of 318 clinic cases in Oklahoma; 12 percent of 162 workers X-rayed in North Carolina; and 24 percent of 723 workers X-rayed in Vermont.

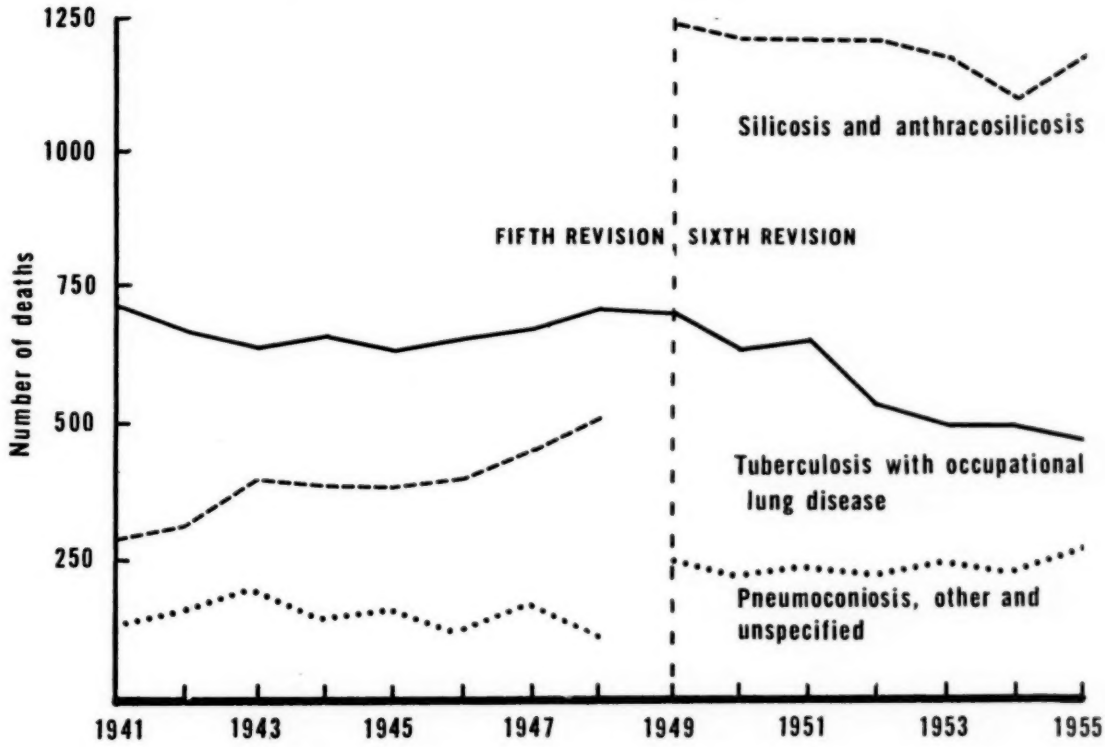
These data give the impression that pulmonary tuberculosis is not as damaging to health of silicotics as it once was, and even with the complication many silicotics live to old age. For example, men with simple and complicated silicosis had the same average age, 56 years, and length of employment, 32 years, according to X-ray examination records of Vermont granite shed workers living during 1950–55. Workers deceased during the same period were, on the average, 6 years older than those in the living group. The only other difference observed was that the persons in the deceased group who also had tuberculosis had worked an average of 4 years less.

This summarizes the few general facts we were able to glean from records on the nature and extent of silicosis in the United States. The current figure of 12,763 cases reflects the extent of our success in collecting statistics on silicosis rather than serving as a measure of prevalence. As such, it is a gross underestimate, owing to the incompleteness of sources of data and lack of statistics for other States with silica hazards.

Mortality Statistics

Further proof of the inadequacy of our so-called prevalence figure lies in mortality statistics of the National Office of Vital Statistics. About 20 percent of the 12,763 cases on record in 26 States during 1950 to 1955 were known to have died. In the entire United States over the same period, 11,650 deaths were recorded as due to occupational pneumoconioses, or an average

Figure 1. Deaths from pneumoconioses in the United States, 1941–55.



of almost 2,000 per year (*16*). Tuberculosis with mention of occupational disease of the lung accounted for 28 percent of the 11,650 total; silicosis and anthracosilicosis for 60 percent; and unspecified and other pneumoconioses for 12 percent. The 12 percent includes a small number of deaths from asbestosis and anthracosis; however, most are unspecified pneumoconioses and are probably silicosis.

It is not possible to determine to what extent mortality from dust diseases in the United States has increased or decreased over the past years. Figure 1 presents the number of such deaths since 1941. However, prior to 1949, a fixed system of priorities was used in selecting the cause of death to be tabulated. With the sixth revision of the International List of Causes of Death, the cause of death tabulated was, in general, that designated by the certifying physician as the underlying cause of death. This change in coding rules has therefore increased the number of deaths assigned to pneumoconioses since 1949.

The graph suggests, however, that the number of deaths due to tuberculosis with mention of occupational disease of lungs has been gradually decreasing. The trend for silicosis and anthracosilicosis shows a rise for the first coding period and a level plateau for the second period. It is believed that the calculation of rates, even if the exposed population were known, would not materially affect this picture. If increases in employment in the manufacturing industries and decreases in mining are taken into account, the number of workers in dusty trades probably has not changed appreciably over the 1941–55 period. The steady rate at which the silicotic population is dying off gives us a fairly good idea of the extent of silicosis today and in retrospect.

Deaths from pneumoconioses in Pennsylvania accounted for 40 percent in 1953 and 45 percent in 1954 of all such coded deaths in the United States. For this reason, Pennsylvania death certificates were used to obtain further information. With the aid of the National Office of Vital Statistics, we scanned 137,000 death certificates covering January, February, and March 1953 (a trial period), and the entire year 1954. Information was transcribed on age,

occupation, and causes of death for all certificates giving silicosis, anthracosilicosis, or pneumoconiosis as a primary or contributory cause of death.

In this manner, we obtained a population of 1,519 deaths among silicotics for the 15-month period. Pneumoconiosis as a primary cause of death was assigned officially to 60 percent of this 1,519 total; other causes of death were assigned to 40 percent. Thus, 2 out of every 5 deaths among silicotics were attributed to other causes.

Although uncomplicated silicosis is showing up on death certificates with relatively greater frequency, it is still commonly omitted. For instance, in another State where I had access to the compensation files, silicosis was not mentioned on 42 out of 269 death certificates filed with the claims, although the majority of these cases had received disability benefits for many years prior to death.

The causes of death on the 1,519 death certificates were tabulated to determine what other conditions are associated with these deaths. After several futile attempts at multiple-cause coding, the tabulation shown in the table emerged. It is offered for whatever it may be worth; I have made no attempt to interpret it.

Frequency of other conditions mentioned on 1,519 death certificates listing silicosis, anthracosilicosis, or pneumoconiosis as a primary or contributory cause of death, January–March 1953, January–December 1954, Pennsylvania

Condition	Number	Percent
Only silicosis, anthracosilicosis, or pneumoconiosis mentioned	218	14.4
Respiratory tuberculosis	143	9.4
Cancer, respiratory system	50	3.3
Cancer, other sites	58	3.8
Cerebral hemorrhage, thrombosis	67	4.4
Heart and other disease of circulatory system	861	56.7
Bronchial asthma	67	4.4
Influenza, pneumonia, bronchitis	139	9.2
Ulcer, hernia, cirrhosis of liver, and other disease of digestive system	60	3.9
Nephritis and other disease of genitourinary system	57	3.8
Accidents	10	.7
Cor pulmonale	236	15.5
Emphysema	89	5.9
Pulmonary hemorrhage	35	2.3
Pulmonary edema	61	4.0

An age distribution showed that none of the deceased was under 40 years of age at the date of death; 5 percent were between 40 and 49 years old; 39 percent between 50 and 64 years; and 56 percent over 65 years. There were more deaths under 65 years of age among those who also had tuberculosis, 59 percent, than among the others, 43 percent. In our prevalence study we reported that individuals with silicosis are living a relatively full life span.

By occupation, 76 percent of the 1,519 deceased were miners. Coal mining was specified occasionally, but rarely was it described as anthracite or bituminous. Occupations for the remaining were: foundry or steelwork, 6 percent; stonecutting, quarrying, brickmaking or other work associated with silica exposures, 2 percent; painter, electrician, repairman, truckdriver, watchman, restaurant worker, clerk, farmer, or other occupations not associated with silica exposures, 9 percent; and laborer not otherwise specified, retired, or not known, 7 percent.

Compensation Costs

The most forceful evidence we have of silicosis as a continuing problem is what the disease costs society today. The compensation costs of 9,829 cases on record between 1950 and 1955 in 18 States amounted to $43,693,000. This amount covers benefits paid on open cases up to 1954 or 1955 and awards allowed or paid in death cases. It covers a 6-year period for 4 States, a 5-year period for 9 States, and between 2 to 4 years for 5 States. Medical costs are not consistently included or reported. Making allowances for incompleteness of information and allowing for costs in other States for which data were not available, compensation costs of silicosis cases outstanding since 1950 can be estimated to be at least 10 million dollars per year. In contrast, the budgets of official industrial hygiene agencies for the entire country amount to less than 3 million dollars annually. These agencies are responsible for the control and prevention not only of silicosis but also all other occupational diseases.

In 6 States (Alabama, Montana, New York, Ohio, Pennsylvania, and West Virginia) sili-

cosis costs for varying periods between 1950 and 1955 ranged from $2,232,000 to $12,608,000. In the other 12 States (Arkansas, California, Colorado, Idaho, Illinois, Nevada, New Jersey, North Carolina, Utah, Virginia, Wisconsin, and Washington) the spread was from $78,116 to $795,431.

Compensation for silicosis is a slow, costly, and complicated business. Requirements for eligibility, determination of liability, assessment of disability, amounts of awards, and methods of processing cases differ tremendously from State to State. In the group of 18 States, the average cost per case ranged from $1,390 in West Virginia to $16,180 in New York. Individual payments were as low as $380 for temporary disability in New Jersey and $1,000 for stage 1 silicosis in West Virginia and as high as maximum indemnity awards of $12,000 in Utah, and more than $20,000 in States with unlimited benefits such as Ohio. When medical benefits are added, costs of some cases exceed $30,000 each.

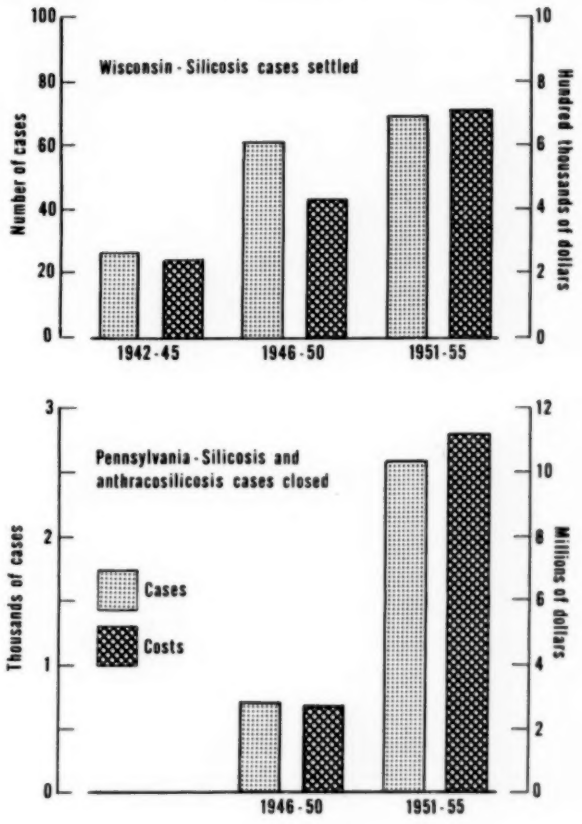
The average cost per case for the 18 States combined is $4,450. In contrast, the average cost of compensation claims for all work injuries in the United States ranged from a low of $343 in Alabama to a high of $1,055 in Montana (*17*).

Data on compensation costs for earlier years are scarce. Lanza reported that claims for silicosis compensated in 1938 and 1939 average 10 to 12 per year in the industrialized States (*14*). Up to that time legislation was comparatively new and not widespread. The few States then reporting costs, Wisconsin among them, found that dust diseases accounted for one-third to more than 90 percent of all the occupational disease costs.

The experience of two States, Pennsylvania and Wisconsin, which have published continuous data, shows that costs since 1950 have increased substantially (fig. 2). This is typical of what has probably occurred in many other States. One of the many reasons for the increased claim load is that most of the occupational disease compensation laws were passed after 1940, and since 1950 many have been liberalized.

These figures, impressive as they may be, cover only a fraction of the costs and burdens

Figure 2. Compensation costs in two States.



on today's society of the accrued liability of preventable disease. Countless numbers of true silicotics not legally eligible for compensation are forced to turn elsewhere for help. If restrictions in laws were lifted, the costs would undoubtedly skyrocket to unforeseen proportions.

Conclusions

This, in brief, sums up the evidence we have on silicosis as a continuing problem. The majority of cases on record represent disabled workers and a backlog of early acquired silicosis. The major impact on society is an economic one as reflected in high compensation costs.

The true extent of nondisabling silicosis cannot be determined from official records as yet. There is sufficient evidence, however, to suggest that this group of not yet discovered or disabled silicotics may be important in perpetuating the silicosis problem. There is also evidence of need

for more support for preventive activities by official agencies. Prevention is still cheaper than compensation.

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Topical Applications Of Sodium Fluoride And Stannous Fluoride

GEORGE A. NEVITT, D.D.S., M.S.P.H.,
DAVID H. WITTER, D.D.S., M.P.H.,
and WINSTON D. BOWMAN, D.D.S.

SODIUM FLUORIDE applied topically to the teeth gives approximately 40 percent reduction in the incidence of dental caries in children (*1–3*). Other fluoride compounds may be even more effective. Laboratory studies suggest that stannous fluoride is superior to sodium fluoride in reducing the solubility of powdered dental enamel (*4–6*) and whole tooth sections in weak organic acids (*7*), and experimental studies in hamsters (*8*) and rats (*9–11*) have corroborated these findings. Also, there are reports of approximately 60 percent reduction in dental caries in children when stannous preparations were used (*12–14*).

The present study has tested further the effectiveness as dental caries preventives of 2 percent stannous fluoride and 2 percent sodium fluoride. Nearly 600 children 9–14 years old in Milwaukie and Oregon City, Oreg., participated in all phases of the 16-month study. The children were divided into two comparable groups, one group receiving stannous fluoride and the other sodium fluoride.

Materials and Methods

In Milwaukie and Oregon City, Oreg., a questionnaire was sent to the parents of all children in grades 4 through 9. The questionnaire was used to obtain parental permission for the children to take part in the study and to identify children who had had previous exposure to fluoride. The parents of 69 percent of the children in the 5 grades requested that their children participate in the study. All these children were included except those whose questionnaires indicated that they had previously received topical fluoride applications or had lived at some time in an area having more than 0.3 ppm of fluoride ion in the water supply. The fluoride content of the public water supply in Milwaukie was 0.25 ppm; in Oregon City, it was 0.20 ppm.

The names of 690 children who were to participate were listed alphabetically by age and sex. Every other child was assigned to one treatment group and the remainder to a second treatment group. In alternate children within each of these groups, the right quadrants received the treatment, and in the remainder, the left quadrants. No selection was made on the basis of caries susceptibility.

A dental prophylaxis was given prior to the initial examination. All examinations were made in December 1955 by the authors, with No. 4 plane mouth mirrors and No. 23 single-end explorers under artifical light. Portable dental chairs were used. Compressed air was applied routinely to each quadrant during examination.

Both fluoride solutions were applied four times by the same dental hygienist, using the method described by Knutson (*15*). The treatments were begun in January 1956 and completed within 4 months. One group of children received a 2 percent aqueous, unbuffered sodium fluoride solution. The other group received a 2 percent aqueous, unbuffered stannous fluoride solution. In all children, the solution being tested was applied to one side of the mouth, and distilled water to the other side. Celluloid strips were used between the central incisors, both upper and lower, to help prevent the fluoride solution from contacting the untreated side. The sodium fluoride solution was prepared daily. The stannous fluoride solution was prepared hourly with oxygen-free distilled water, since it deteriorates rapidly (*16, 17*).

Dr. Nevitt was regional dental consultant for the Public Health Service in Region 9, San Francisco, when this study was conducted. He is currently on a 1-year assignment as dental health adviser with the World Health Organization in its Eastern Mediterranean Regional Office, Alexandria, Egypt. Dr. Witter is director of the dental health section, Oregon State Board of Health, Portland, and Dr. Bowman, formerly a dental officer with the Public Health Service in Region 9, is now in private practice in Richmond, Calif.

Table 1. Age distribution of 588 children available for reexamination at the end of a 16-month period, Milwaukie and Oregon City, Oreg.

Fluoride solution [1]	Number of children by age (last birthday) at time of first examination						
	9	10	11	12	13	14	All ages
Stannous fluoride	29	19	21	71	66	84	290
Sodium fluoride	35	23	18	58	76	88	298
Total	64	42	39	129	142	172	588

[1] All children received four applications.

Of 671 children treated in the study, 588 were available for reexamination in April 1957, 16 months after the first examination. Of these 298 were treated with sodium fluoride and 290 with stannous fluoride. Each of the dentists examined the same children he had examined originally. Equipment and procedures used for the reexamination were identical with those of the first examination. New record cards were prepared so that the examiner would not know the results of his first examination nor which solution had been used. A prophylaxis was given before the second examination to remove any stains that might have developed from the application of stannous fluoride.

In this discussion, analysis of the data on caries experience is confined to the erupted permanent teeth seen at the time of the initial examination. The age classification refers to the age (last birthday) at the time of the first examination (table 1).

Results

The caries experience of the 588 children available for the second examination is shown in table 2, and the percentage reduction in the incidence of newly carious teeth and of carious surfaces in previously carious teeth is given in table 3.

Of 1,087 upper permanent noncarious teeth treated with stannous fluoride, 131, or 12 percent, became carious. In the untreated quadrants, 244 of 1,084 teeth, or 23 percent, became carious. The proportion of teeth that became carious is significantly lower among the treated than among the untreated teeth.

Of the 1,103 upper permanent noncarious teeth that were treated with sodium fluoride, 171, or 16 percent, became carious. Again, the proportion of treated teeth that became carious is significantly lower among the treated than among the untreated teeth.

There were more noncarious permanent teeth in the lower arch of the 588 children than in the upper arch, and a smaller percentage of the teeth in this arch became carious whether treated or not. However, in the lower arch as in the upper one, the proportion of newly carious teeth is significantly lower among the treated

Table 2. Dental caries experience during a 16-month period in permanent teeth of fluoride-treated and untreated mouth quadrants of 588 children, Milwaukie and Oregon City, Oreg.

Treatment groups, by treated and untreated quadrants	Number of noncarious teeth, December 1955	Newly carious teeth, April 1957		Carious surfaces in newly carious teeth	Newly carious surfaces in previously carious teeth	Total newly carious surfaces
		Number	Percent			
Stannous fluoride:						
Treated upper quadrant	1,087	131	12	175	221	396
Untreated upper quadrant	1,084	244	23	320	243	563
Treated lower quadrant	1,261	88	7	119	186	305
Untreated lower quadrant	1,247	150	12	214	211	425
Sodium fluoride:						
Treated upper quadrant	1,103	171	16	237	192	429
Untreated upper quadrant	1,105	257	23	343	203	546
Treated lower quadrant	1,317	79	6	112	164	276
Untreated lower quadrant	1,312	133	10	171	194	365

Table 3. Percentage fewer newly carious teeth and tooth surfaces during a 16-month period in permanent teeth of fluoride-treated mouth quadrants of 588 children, Milwaukie and Oregon City, Oreg.

Fluoride solution	Percentage fewer newly carious teeth			Percentage fewer newly carious surfaces of previously carious teeth		
	Upper arch	Lower arch	Both arches	Upper arch	Lower arch	Both arches
Stannous fluoride	46. 3	41. 3	44. 4	9. 1	11. 8	10. 4
Sodium fluoride	33. 5	40. 6	35. 9	5. 4	15. 5	10. 3

than among the untreated teeth regardless of the fluoride solution used.

In the upper arch, a smaller proportion of caries-free permanent teeth became carious after treatment with stannous fluoride than after treatment with sodium fluoride. This difference is statistically significant. In the lower arch, the proportion of caries found in teeth treated with stannous fluoride is not significantly different from the proportion in those treated with sodium fluoride. Neither is there a significant difference in caries incidence between the two types of treatment when the data for both arches are combined.

The reduction in the incidence of dental caries on tooth surfaces of previously carious teeth was not significant for either the sodium or stannous fluoride solutions.

As long as 4 months elapsed between the initial examination and the beginning of treatment of some children. If each child had received treatment immediately following examination, the demonstrated effectiveness of the fluoride solutions might have been greater than that observed in this study.

Summary

Two groups of school children 9–14 years of age were given topical applications of stannous fluoride and sodium fluoride to test the effectiveness of these preparations as dental caries preventives. One group was treated with a 2 percent stannous fluoride solution and the other with a 2 percent sodium fluoride solution. The upper and lower quadrants on one side of the mouth were treated, and the quadrants on the other side served as controls.

Analysis of data on 588 children reexamined 16 months after the initial examination indicated that:

1. The incidence of dental caries in permanent noncarious teeth was significantly lower in mouth quadrants treated with either stannous fluoride or sodium fluoride than in untreated quadrants.

2. The findings relative to the comparative effectiveness of stannous fluoride and sodium fluoride were inconclusive.

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Institute of Perinatal Casualties

An institute on perinatal casualties will be held jointly on December 8–12, 1958, by the University of Michigan School of Public Health and the University of Minnesota School of Public Health in Minneapolis, Minn. Michigan and Minnesota State maternal and child health and crippled children's agencies are also sponsors.

The institute will consist of a series of seminars and discussions on such aspects of perinatal casualties as definition, extent and significance; etiology; prevention; growth and development; coordination of services; mortality studies; care of the premature infant; specialized programs, such as mental retardation, cerebral palsy, and congenital heart disease; and program planning and evaluation.

Each State in Regions V and VI may select at least four staff members (two each from MCH and crippled children's programs) to attend the institute. Travel expenses, tuition, lodging, and meals of each person selected will be financed by the U. S. Children's Bureau.

For further information Region V applicants should contact Dr. Donald C. Smith, University of Michigan School of Public Health, Ann Arbor, Mich., and Region VI applicants should contact Dr. Helen M. Wallace, University of Minnesota School of Public Health, Minneapolis, Minn.

The Public Health Program for Mexican Migrant Workers

NORMA J. ROBINSON

CONTINUAL EFFORT has been made by the Public Health Service to identify the health problems and to establish specific health requirements for migrant laborers coming into this country.

Of the 1¼ million migrant laborers employed in agriculture in the United States, approximately one-half million are foreign nationals, principally from Mexico. The Mexican component is about 450,000. Those who are recruited in Mexico for brief periods of time to meet a specific need are called braceros (from the Spanish word for "arm"). During 1957, braceros were employed in 27 States, ranging from California on the west coast to Delaware in the east.

The program for employment of foreign labor in the United States requires that each worker pass a physical examination. Today, the Public Health Service has developed a procedure for screening large numbers of laborers in a relatively short period of time.

Early Recruitment

Mexico has been a source of labor for the United States for many years. For a long period, however, this recruiting was unsupervised. Workers were brought in without adequate guarantees as to employment, housing, sanitary conditions, and wages. The working conditions and ultimate economic status of many of the Mexican laborers in the United States became a serious problem for this country and for Mexico. Particularly during the period of economic depression following 1929, distress was general among the Mexican residents in the United States; consequently, many of the laborers returned to Mexico in various degrees of destitution. The Mexican Government was therefore prompted to incorporate in the Mexican Federal Labor Law of 1931 definite regulations governing the migration of Mexican workers, and the Mexican Constitution outlined these workers' rights, including compensation for injuries or illnesses and the guarantee of return transportation for workers given contracts for employment outside the country (*1a*). This official act had a marked impact on the emigration of laborers and the establishment of standards for the employment of Mexican agricultural workers.

Historically, the Division of Foreign Quarantine of the U. S. Public Health Service has had specific responsibility for preventing the introduction of quarantinable and other dangerous and contagious diseases into the United States and for preventing the entry of aliens with mental and physical conditions excludable under the immigration laws. Prior to World War II, medical inspections of Mexican nationals entering the United States were performed at the ports of entry along the Mexican border. For the temporary visitor, the medical inspection was rather cursory. However, it appears that particular attention was given to inspecting for pediculosis to prevent the introduction of typhus fever, and disinfestation was frequent. Mexican nationals were permitted to

Miss Robinson is a management analysis officer, General Methods Staff, Office of the Surgeon General, Public Health Service.

enter the United States as temporary visitors for work on farms during limited periods.

During World War II

At the beginning of World War II, demands for personnel in the war industries and the armed services created labor shortages, particularly in agriculture. The Mexican Government was requested to provide Mexican laborers for agricultural work in the United States, and in July 1942 that government consented to grant labor assistance as a part of its contribution to the war effort.

During and following World War II, the responsibility for the Mexican labor recruitment program was assigned to several United States agencies, such as the Farm Security Administration, the War Manpower Commission (with the U. S. Employment Service and U. S. Selective Service), and various branches of the U. S. Department of Agriculture (*1b*). Within the administrative framework of the Farm Security Administration, and subsequently the War Food Administration, provision was made for carrying out a medical program for the agricultural workers. Accordingly, funds for the medical examination program were transferred from the responsible agency to the Division of Foreign Quarantine, Public Health Service.

Teams of Public Health Service medical officers from the Foreign Quarantine, Venereal Disease Control, and Tuberculosis Divisions were sent to Mexico to carry out examinations in cooperation with Mexican health officials.

According to a Public Health Service report on the history of the physical examinations, these officers followed traditional medical procedures used for immigrants. The workers were examined for conditions of the skin, heart, lungs, and teeth and for venereal diseases. Tests were also made of the eyes, ears, nose, and throat, the blood pressure, and the general skeletal, muscular, and nervous systems. Most laborers were vaccinated or revaccinated for smallpox and given initial typhoid inoculations. In addition, photofluorographic chest X-rays and serologic tests were given to prospective laborers when facilities permitted.

When the war emergency program began, the selection of eligible laborers was carried out in Mexico City, a practice which made possible a centralized examination program. However, at the end of 1944 the selection center was moved from Mexico City to Irapuato, and, subsequently, other selection centers were established and operated at the discretion of the Mexican Government (*1c*). Medical personnel with mobile X-ray units were sent from the Public Health Service to the recruiting points within Mexico, where numerous problems arose in operating the units (*2*). After 1 or 2 years' experience, Public Health Service medical officers were sent to the recruiting points in Mexico solely to assist local physicians in X-ray and other medical procedures connected with mass examinations.

After World War II

Following World War II, recruiting continued under the provisions of international executive agreements between Mexico and the United States. Unfortunately, these agreements frequently were delayed until the need for such laborers in the United States was acute, and without an agreement, Mexican citizens could not be legally recruited. At the same time it was known that there were Mexican citizens entering the United States illegally for agricultural work.

According to a U. S. Department of Labor report, the number of Mexicans who entered this country illegally (wetbacks) increased from 29,000 in 1944 to 565,000 in 1950 (*3*). Both countries were concerned about the problem, but the Mexican border, approximately 1,600 miles in length, proved to be difficult to patrol effectively. There were then nine official crossing points along the Mexican border which were staffed by Public Health Service personnel. Although the Immigration Service was guarding the border, the number of patrol officers was not sufficient to force all to enter at the legal crossing points.

It was realized from the start that to give a medical examination, including chest X-ray, to each laborer who entered the United States was impossible. This was especially true during accelerated recruiting activities immediately after the signing of an international executive agreement. In addition, the large segment of the Mexican migrant labor force entering the

United States illegally obviously could not have been examined.

In 1949 the international executive agreement between Mexico and the United States included a significant change which seriously affected the medical examination of Mexican laborers. Under this agreement, laborers illegally in the United States could be recruited and contracted for agricultural work. Subsequent recruiting of wetbacks in the United States was carried out sporadically in scattered areas to meet the labor needs of particular localities. Under these conditions, the Division of Foreign Quarantine could not make complete examinations for tuberculosis. Although the Service could not conduct a comprehensive medical examination program for the illegal entrants, laborers who were recruited in Mexico were given medical examinations at the designated ports of entry, according to the terms of the 1949 agreement.

Legislative Authority

For several years the Mexican Government had been seeking agreements which would prevent the illegal exodus of Mexican workers and protect, with respect to wages and working conditions, its citizens employed in the United States. To insure that the United States would promptly and effectively support compliance with the obligations in the work contracts between employer and employee, the Mexican Government requested that the United States adopt legislation to authorize a United States Government agency to contract workers. Public Law 82–78 giving the legislative authority to employ agricultural workers from the Republic of Mexico was passed on July 12, 1951.

This legislation gave the Secretary of Labor the responsibility for bringing from Mexico agricultural workers subject to United States immigration laws. The Public Health Service, with responsibility for performing the physical and mental examinations of arriving aliens for the Immigration Service, continued to carry out the medical program for the Mexican laborers.

Following enactment of the new law, Mexico and the United States entered into the Migrant Labor Agreement of 1951. This agreement allowed establishment of migratory centers in Mexico and reception centers in the United States to recruit and contract Mexican laborers. Both Public Law 78 and the Migrant Labor Agreement have been extended periodically. The present legislative authority will expire on June 30, 1959.

Medical Examination

It was agreed that the Public Health Service would conduct at the migratory centers in Mexico a physical and mental examination of each laborer to assure that he met the mental and health requirements for admission to the United States. If facilities were available, each laborer would be physically examined and given a photofluorographic chest X-ray, with modern equipment, and a serologic test. Service physicians were to be assisted by Mexican physicians who would later replace them. In accordance with the agreement, the migratory centers in Mexico were to be located at Aguascalientes, Aguascalientes; Guadalajara, Jalisco; Irapuato, Guanajuato; Monterrey, Nuevo Leon; and Chihuahua, Chihuahua.

On September 13, 1951, Public Health Service personnel and equipment for the photofluorographic activities at the migratory centers in Irapuato, Guadalajara, and Aguascalientes were dispatched to Mexico. However, inadequate electric power for operating fluorographic equipment made X-raying impossible. At Aguascalientes and Guadalajara it was reported that electric power could not be brought to buildings housing the X-ray equipment. In addition, power stations were reportedly shut down during daylight hours, and Service personnel were advised that there were troublesome voltage variations in the local municipal systems. During the period from September 13 to October 17, 1951, no X-rays were made. Because of these difficulties, it was concluded that the program had to be performed at the reception centers in the United States.

By October 31, 1951, approximately 120,000 laborers had been admitted to the United States without receiving chest X-rays. As a solution, the photofluorographic equipment was moved from the migratory centers in Mexico to reception centers in the United States. At Eagle Pass, Tex., the first X-rays were taken on No-

vember 4, 1951. Photofluorographic equipment was installed at the reception centers in El Paso and Harlingen, Tex., and El Centro, Calif., and was in operation about 30 days after the establishment of the X-ray program at the Eagle Pass reception center.

The reception centers were successful in taking only 8,028 X-rays during the rush season. The reason for this limited number was that the majority of laborers had received contracts when the difficulties were being encountered in Mexico and before it was possible to install photofluorographic equipment at the reception centers in the United States. Many of the laborers X-rayed had already been in the United States and were returning to the reception centers to be recontracted.

Migratory and Reception Centers

There are, then, two types of migratory labor processing centers: migratory centers in Mexico and reception centers within the United States along the Mexican border. The reception centers in the United States now are at Hidalgo, Eagle Pass, and El Paso, Tex.; Nogales, Ariz.; and El Centro, Calif. In Mexico the number and the location of the migratory centers are influenced by the demand for laborers. During fiscal year 1957, Mexico's migratory centers were at Empalme, Sonora; Monterrey, Nuevo Leon, and Chihuahua, Chihuahua. Each migratory center recruits the laborers in accordance with requests received from the reception centers.

Until 1954, illegal entrants from Mexico continued to pose a serious problem. While the recruiting program contracted about 200,000 laborers under the terms of the international agreement during 1953, it was estimated that approximately 1 million Mexicans crossed the border illegally to accept employment.

In 1954, the U. S. Department of Justice increased the number of border patrol officers and took other effective measures leading to the gradual decline in the illegal entry of Mexican laborers.

A concomitant change occurred in the number of laborers recruited to fill the gap produced by the decline in illegal immigration. Based on experience, the U. S. Department of Labor had planned to request 260,000 laborers from Mexico during fiscal year 1955; however, it was necessary to recruit 350,000 laborers during that year in order to meet the demand. The number of laborers contracted each year has continued to increase, as indicated by the 428,416 laborers during fiscal year 1956 and 450,162 laborers during fiscal year 1957. Today the wetback problem has been largely resolved, and braceros are provided by the controlled farm labor program.

Current Medical Program

The action taken to control illegal immigration has made possible the conduct of an effective medical program for Mexican laborers. Since 1954, every laborer contracted by the U. S. Department of Labor has been given a medical examination. In addition, the medical program is geared to meet the increases in the need for agricultural workers, without sacrificing the quality of the medical examinations.

The entire medical program for Mexican laborers at the migratory centers in Mexico and the reception centers in the United States is carried out under the direction of the Public Health Service medical officer assigned to the district quarantine station, El Paso, Tex. Mexican doctors and nurses are employed to perform the medical examinations at the migratory centers in Mexico, and Public Health Service doctors and a limited number of contract doctors conduct the medical program at the reception centers in the United States.

The medical examination at the migratory centers in Mexico is essentially a screening process. On the basis of clinical diagnosis, laborers who have tuberculosis, venereal diseases, or other conditions making them unfit for accepting employment in the United States are rejected. Those who pass the physical examination are vaccinated for smallpox. The vaccine is provided by the Mexican Government without cost to the United States farm placement program.

The primary purpose of the physical examinations at migratory centers in Mexico is to eliminate unnecessary hardships for the Mexican laborers. Those who are rejected at the migratory centers are spared the trip to the reception center and the disappointment of being rejected and returned to the migratory center. In addition, the Mexican physicians at the migratory centers aid the laborers in finding medical care, frequently at the office of the Mexican health service, for remediable conditions. The record of medical rejections at the migratory centers for the fiscal years 1952 through 1957 is shown in table 1.

Laborers who pass the physical examination at the migratory centers are transported, under the supervision of the U. S. Labor Department, by railroad or bus to the reception centers. There they are first processed by the Public Health Service personnel. Each laborer and his personal effects are dusted with an insecticide. The laborer is then examined for evidence of venereal disease, given a photofluorographic chest X-ray, and examined for any other physical conditions which would be contagious or make the laborer unfit for agricultural work. All laborers with evidence of venereal disease are routinely treated, and most of them are then permitted to accept employment. However, when a venereal disease case cannot be cured with a single treatment, the laborer is rejected and returned to Mexico.

All laborers with tuberculosis, contagious diseases, or other disqualifying physical defects are rejected and returned to the migratory centers in Mexico. In accordance with the joint operating instructions between the United States and the Mexican Government, effective July 1, 1956, laborers rejected at the reception centers must be reported to the Mexican consul. The Public Health Service doctor at the reception center gives the worker and the Mexican consul a written diagnosis of the case so that the information may be transmitted to the appropriate Mexican authorities. The medical causes for rejection and the number of laborers rejected at the reception centers for the fiscal years 1952 through 1957 are shown in table 2.

Medical Program Cost

Employers of Mexican laborers reimburse the United States Government for all expenses of the Mexican farm labor program, except costs of U. S. Department of Labor personnel, through a revolving fund to which employers pay a fixed fee per worker hired. The remainder of the fund is made up of Department of Labor appropriations. Since 1954 the costs of medical examinations of Mexican laborers have been charged to that fund.

Medical expenses are incurred for (*a*) medical examinations and vaccinations performed

Table 1. Medical rejections at the migratory centers for fiscal years 1952 through 1957

Fiscal year	Number of laborers examined	Medical causes for rejection				Total rejected	Rate of rejection
		Mental	Tuberculosis and pulmonary conditions	Venereal disease	Other conditions		
1952	187, 569	5	29	373	3, 206	3, 613	1. 92
1953	205, 941	70	93	588	7, 033	7, 784	3. 77
1954	180, 871	1	27	394	5, 432	5, 854	3. 23
1955	263, 376	0	52	1, 189	4, 353	5, 594	2. 12
1956	415, 210	2	87	3, 190	6, 778	10, 057	2. 42
1957	440, 332	3	35	1, 808	3, 741	5, 587	1. 26

Table 2. Medical causes for rejecting Mexican migrant laborers and number rejected at the reception centers during fiscal years 1952 through 1957

Fiscal year	Number of laborers examined	Medical causes for rejection				Total rejected	Rate of rejection
		Mental	Tuberculosis and pulmonary conditions	Venereal disease	Other conditions		
1952	333, 071	12	676	75	116	879	0. 26
1953	292, 891	39	2, 536	523	764	3, 862	1. 3
1954	221, 119	23	2, 724	188	658	3, 593	1. 6
1955	340, 070	9	4, 357	271	1, 132	5, 769	1. 7
1956	435, 332	13	5, 277	16	451	5, 757	1. 3
1957	457, 360	14	5, 050	98	416	5, 578	1. 2

at the migratory centers in Mexico, (*b*) hospital and medical care for laborers who are injured or become ill between migratory centers and the reception center or at the reception center, and (*c*) medical examinations performed at the reception centers in the United States.

The Foreign Quarantine Division conducts the entire medical program at a minimal cost to employers. During fiscal year 1957 Mexican laborers were examined at the migratory centers in Mexico at a cost of approximately 20 cents per laborer. The complete medical examinations, including chest X-rays, at the reception centers in the United States, for 457,360 laborers amounted to approximately 73 cents per laborer. The medical examinations at the migratory centers in Mexico, hospital and medical care provided by the Public Health Service, and medical examinations at the reception centers in the United States were performed, on the average, for 95 cents per laborer receiving a contract for employment in the United States.

Today the medical program for the examination of Mexican laborers conducted by the quarantine service is effective because many of the problems plaguing efforts to conduct a complete medical program during and after World War II have been resolved. Control of illegal labor immigration, development of new techniques and equipment, and research have all contributed to the success of the present medical program. However, the program is subjected to continuous review and analysis in order to improve further the techniques and procedures and to resolve the challenging problems still encountered.

Venereal Disease Program

For many years the Public Health Service and certain State health departments have been concerned about the possible importation of venereal infections into the United States by immigrants. In the examination program for Mexican laborers, the venereal disease aspect has received considerable attention. Mexican laborers recruited since the early part of World War II have been medically examined, and, whenever laboratory facilities have been available, have been given serologic tests for the detection of syphilis.

Prior to 1951 all serologic tests were performed in Mexico. However, in 1951 the migratory labor agreement between Mexico and the United States permitted Public Health Service physicians to carry out such examinations and treatment of positive cases of syphilis.

Since the beginning of fiscal year 1955, the Venereal Disease Program in cooperation with the Division of Foreign Quarantine, the Department of Labor, and several State health departments has serologically screened more than 300,000 migrant agricultural workers from Mexico. The annual figures are as follows:

Fiscal year	*Number tested*	*Number reactors*	*Percent reactive*
1955	24, 750	2, 614	10. 6
1956	31, 712	2, 914	9. 2
1957	165, 355	12, 559	7. 6
1958 [1]	96, 376	8, 008	8. 3

[1] 7 months.

Screening of the migrant group for syphilis has been hindered by the fact that the blood specimens had to be mailed to distant laboratories for testing and the braceros were dispersed to various working localities before the test results were known. The reactors had to be traced to their place of work and brought in for diagnosis before they could be treated for syphilis. This procedure involved costly fieldwork and complicated recordkeeping. The Venereal Disease Program has solved this problem by developing a rapid blood test that gives immediate on-the-spot results. The new test, known as the rapid plasma reagin (RPR) test, is now being demonstrated in the Mexican migrant testing program at El Centro, Calif., and reactive cases are detected immediately, diagnosed, and treated. Thus the need for field investigation work and records has been entirely eliminated.

In addition to diagnostic and treatment services provided at the El Centro reception center, epidemiological reports are prepared on marital contacts of venereally infected braceros and referred to State health departments in Mexico for followup.

Recently the Public Health Service presented to representatives of the U. S. Department of Labor and to growers concerned with the farm labor program of Mexico a plan for conducting a serologic screening service at the reception centers. This plan was unanimously approved although the screening as proposed means some additional cost to the growers. The demonstration project in El Centro was taken over by the Division of Foreign Quarantine on July 1, 1958, and similar activities are expected to start by September 1 at the three other large reception centers on the border. The Venereal Disease Branch of the Communicable Disease Center, Public Health Service, is assisting the Division of Foreign Quarantine by supplying personnel to advise on program requirements, to help train laboratory workers in RPR testing, and to assist in initiating the program at the other centers.

Photofluorographic X-rays

To the extent that X-ray facilities have been available and Mexican laborers legally recruited, it has been possible to prevent Mexican laborers with tuberculosis from entering the United States. As effective control measures were taken to prevent illegal migration from Mexico, the number of laborers who were X-rayed and rejected under a controlled recruitment program continued to increase. Only 61,654 Mexican laborers were X-rayed during 1952 as compared with the 457,360 Mexican laborers in 1957.

Efforts were directed to establishing a complete X-ray program following the decision to carry out the X-ray program at the reception centers in the United States rather than at the migratory centers in Mexico. Because the X-ray activities required more time than any other phase of the examination, developing the most efficient methods of operation was emphasized. Today peak workloads of approximately 4,000 laborers per day are processed by achieving maximum capacity from each machine. The records reveal that two X-ray machines have taken as many as 5,400 photofluorograms during one 24-hour period. The total process, taking photofluorograms, developing the film, and reading the X-rays, has been accomplished at the reception centers without time delays.

While the laborers are at the reception centers, the photofluorograms are read by physicians with special training in radiology. When the X-ray reveals that a laborer has tuberculosis, the laborer is returned to Mexico. During the fiscal years 1952 through 1957, approximately 20,000 Mexican laborers were returned for that reason.

The rate of rejection of laborers with tuberculosis appears to be declining. Of the total examined, 1.22 percent were returned during fiscal years 1954 and 1955, 1.14 percent during 1956, and 1.07 percent during 1957.

In the past, one cause of a slowdown in the X-ray work had been the need to make 14″ x 17″ X-ray plates whenever the 70 mm. photofluorogram suggested tuberculosis or any other disqualifying condition. A recently developed X-ray camera improves the quality of the film to the extent that 14″ x 17″ X-ray plates are no longer necessary. In addition to saving the cost of the 14″ x 17″ X-ray plates, the new camera decreases the radiation exposure to about one-third of that received from the pres-

ent equipment. Plans are being made to install this camera at all reception centers.

Louse Control

The human body louse is the well-known transmitter of typhus, one of the six quarantinable diseases. In the course of careful control activities against the insect, including disinfestation with DDT, the question of louse resistance to that insecticide arose.

Historically, DDT-resistant body lice were first observed in Korea in 1951. The insecticide, used so effectively throughout the world in the control of lice, and certain others used since 1945 were no longer effective in the control of body lice in that war area. It was found, however, that lindane brought satisfactory control. Also, an insecticide mixture containing pyrethrum, used for many years in insect control work, proved effective against DDT-resistant lice. Unfortunately, however, it was found that pyrethrum does not possess the highly desirable residual quality of DDT and lindane.

Further, findings in 1953 from a survey of the World Health Organization showed an alarming degree of insecticide resistance, particularly to DDT, in the lice studied in a number of countries. This survey found resistance to DDT in body lice in Mexico and reported a few instances of louse resistance to lindane and even to pyrethrum, findings corroborated in more recent studies.

During February and March 1957, the Public Health Service conducted at El Centro, Calif., tests which showed moderate resistance to DDT. When lice were exposed for 24 hours to 0.1 percent DDT in 4 tests, the survival rate ranged from 32 percent to 100 percent. The average survival in these 4 tests was 59.0 percent. When 0.5 percent DDT was used in 6 tests, the survival rate ranged from 9.0 percent to 37.0 percent, with an average of 20.0 percent. Application of 1.0 percent DDT in 6 tests showed a survival rate ranging from 8.0 percent to 35.0 percent, with an average of 20.0 percent. Use of 5.0 percent DDT in 4 tests provided survival rates ranging from 3.0 percent to 40.0 percent, with an average of 25.0 percent. In all tests at least moderate resistance to DDT was exhibited by the lice. These findings are supported by results of studies conducted since.

At least for the present, the use of DDT in louse control work along the Mexican border has been abandoned, and although lindane appears satisfactory now, possibly within the next year or two this insecticide may suffer the same fate. New insecticides must be ready for use at that time. Otherwise, it may become necessary to revert to the cumbersome and expensive louse-control methods used prior to DDT. In that era, clothing, bedding, and other items were treated with steam or dry heat in specially constructed autoclaves or with chemicals such as hydrocyanic acid gas or chloropicrin. Persons were treated with kerosene emulsion soap and other similar crude formulations.

Scientists and insecticide manufacturers throughout the world are striving to find insecticides that may be effectively and safely employed in louse control. The actual efficacy and, particularly, the safe use of new insecticides for the control of body lice on human beings remains to be demonstrated, first in the laboratory and then under operational conditions in the field. The Division of Foreign Quarantine is now planning a research program for studies which will lead to a solution of the insecticide resistance problem.

In spite of setbacks from insecticide resistance, the Foreign Quarantine Division's louse control activities have had some measure of success. It was the opinion of professional personnel making the medical examinations of Mexican laborers in 1951 and 1952 that as many as one-half of the Mexican laborers were suffering from pediculosis. A careful inspection of a number of Mexican laborers during 1956 showed infestation to be only about 10 percent.

Smallpox Vaccination

Mexican laborers are vaccinated against smallpox in compliance with the Public Health Service requirements. Until recently, Mexican laborers were vaccinated each year without regard to previous vaccinations even though the recognized period of immunity after a successful immunization is 3 years. The practice of revaccinating many of the laborers upon reentry was adopted as the most expeditious means of insuring that all laborers were immunized. During the past year the U. S. Department of Justice has adopted the practice

of issuing identification cards on which the date of the smallpox vaccination is stamped. After the Mexican laborers are issued identification cards, they will be revaccinated only at the end of a 3-year period. The revised procedure will provide the necessary immunization against smallpox and, at the same time, reduce the amount of vaccine and personal services needed previously to vaccinate all laborers annually.

Medical Care Program

The Division of Foreign Quarantine provides emergency medical care for Mexican workers who become ill while enroute from the migratory centers in Mexico or who otherwise need emergency medical care while at the reception centers in the United States. Nearby hospitals have been contracted to care for the laborers who develop serious or prolonged illnesses. The need for hospital care is determined by the medical personnel at the reception centers. Expenditures for hospitalization have been extremely low in comparison with the number of laborers who enter the reception centers each year. The cost of hospitalization was $9,331 during fiscal year 1955, $12,586 during 1956, and only $5,649 during 1957.

The requirements for emergency medical care at the reception centers have always been unpredictable. In 1957, an unprecedented need for this care occurred when the Asian influenza became epidemic among the Mexican laborers. A total of 4,122 cases of influenza was reported by the reception centers from August 3 through October 11, 1957. Because of the short duration and mildness of the illness, the patients usually did not require hospitalization, and it was necessary to provide medical care at the reception centers. During the height of the epidemic the medical personnel frequently worked round-the-clock. Only two laborers were sent to contract hospitals for treatment.

After the Mexican laborer has been contracted and leaves the reception center, the employer is responsible for providing medical care. The laborer, while employed in the United States, is given the same guarantees with respect to medical care and compensation that are provided to domestic agricultural workers under applicable State laws. In the absence of such laws, the employer must either obtain an insurance policy or supply an indemnity bond to secure the payment of benefits, including medical, surgical, and other necessary care and treatment, for work-connected illness or injury. In addition to insuring the laborer against occupational risks, the employer must also obtain life and nonoccupational insurance for the Mexican workers. However, the premiums for the latter insurance are deducted from the Mexican worker's wages.

Summary

The recruitment of Mexican laborers, originally a war emergency measure at the beginning of World War II, has become an established program. Mexican laborers are considered essential in the production of agricultural products in the United States, and during 1957 they were employed in 27 States. At present, Mexican laborers represent approximately two-fifths of all the migrant laborers (United States and foreign) employed in the United States.

Since the start of recruitment in 1942, a specific program for the medical examination of these laborers has been carried out by the Public Health Service. However, for many years the Mexican labor program was fraught with unique problems precluding the most effective conduct of its medical phase. The progress of such a program depended upon the establishment of effective international agreements between the United States Government and the Mexican Government. The United States Government, moreover, had to enact special legislation on the employment of Mexican nationals and had to take effective measures to prevent the illegal immigration of laborers into the United States.

Since 1954 every Mexican laborer who has received a contract for employment in the United States has been dusted with an insecticide, vaccinated, examined for evidence of venereal disease, given a photofluorographic chest X-ray, and examined for any other condition which would make the laborer inadmissible or unfit for agricultural work.

Of the challenging problems in the medical

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examination program, louse control is one of the most significant. Scientists throughout the world are searching for new insecticides that may be effectively and safely employed in louse control, and the quarantine service is planning to participate in the laboratory research. The Public Health Service continues to seek new methods to improve the present program in order to prevent the introduction of dangerous contagious diseases into the United States.

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(2) Gregg, R.: Medical examination and vaccination of farm laborers recruited from Mexico. Pub. Health Rep. 65: 807–809, June 23, 1950.

(3) U. S. President's Commission on Migratory Labor: Recommendation. Washington, D. C., U. S. Bureau of Labor Statistics, 1952. Mimeographed.

Rehabilitation of the Deaf-Blind

Publication of a manual to guide the rehabilitation of the deaf-blind was announced at a meeting June 19, 1958, in Washington, D. C., sponsored by the Industrial Home for the Blind in Brooklyn, N. Y., and the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. This book for professional workers is the first such major effort in the United States for the rehabilitation of the deaf-blind.

The manual is the result of 2 years of study and research by the staff of the home and other specialists, supported by a research grant from the Federal agency. It is primarily a summary report of the pilot study, treating rehabilitation of the deaf-blind in simple language. Later volumes will discuss more technical aspects.

At the Washington meeting, Miss Mary E. Switzer, director of the Office of Vocational Rehabilitation, received the first copy of the manual from Peter J. Salmon, executive director of the home. Miss Switzer, pointing out that the key to rehabilitation of the deaf-blind is communication, said that one of the easiest methods is the recently developed international standard manual alphabet, now recommended for worldwide use. In this system, the communicator uses an index finger to outline standard block letters in the palm of the recipient.

A member of the home's staff, Robert J. Smithdas, who holds a master's degree although he has been blind and deaf since childhood, demonstrated the system at the meeting. Others attending the gathering were representatives of Gallaudet College and other organizations concerned with the blind and the deaf.

Peter J. Salmon uses a grease pencil to demonstrate the new international standard manual alphabet. Robert J. Smithdas is the "reader." In actual practice, letters are merely traced in the palm of the hand.

Copies of Rehabilitation of Deaf-Blind Persons: A Manual for Professional Workers are available from the Industrial Home for the Blind, 127 Willoughby St., Brooklyn, N. Y.

Milk Sanitation Honor Roll for 1956–58

Eighty-five communities have been added to the Public Health Service milk sanitation "honor roll," and 51 communities on the previous list have been dropped. This revision covers the period from July 1, 1956, to June 30, 1958, and includes a total of 283 cities and 87 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance suggested by the U. S. Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The suggested milk ordinance, on which the milk sanitation ratings are based, is in effect through voluntary adoption in 480 counties and 1,400 municipalities. The ordinance also serves as the basis for the regulations of 34 States and 2 Territories. In 14 States and 2 Territories it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms to the standards for grade A milk as stated in the suggested ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the suggested ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

This compilation is from the Division of Sanitary Engineering Services, Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1958, pp. 279–282. The rating method was described in Public Health Reports 53: 1386 (1938). Reprint No. 1970.

The rules for inclusion of a community on the honor roll are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included on the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "cleanup campaigns," it is suggested that, when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list unless its milk supply is under an established program of official routine inspection and laboratory control provided by itself, the county, a milk control district, or the State. (In the absence of such an official program, there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey unless a subsequent rating during this period warrants its removal.)

Communities awarded milk sanitation ratings of 90 percent or more, July 1956–June 1958

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
Arizona	
Graham County	10–16–1956
Phoenix	2–__–1957
Colorado	
Boulder County	12–14–1956
Colorado Springs	12–13–1957
Denver	8–27–1957
Las Animas-Huerfano Counties	4–22–1958
Pueblo County	2–13–1958
Weld County	10–24–1957
District of Columbia	
Washington	3– 6–1958
Georgia	
Albany	11–22–1957
Athens-Clarke County	4– 2–1957
Atlanta	8–23–1957
Augusta	2–14–1958
Bainbridge	3–25–1958
Baxley	8–14–1956
Cairo	5– 7–1958
Calhoun-Gordon County	9– 7–1956
Cartersville	1–30–1957
Columbus	1–18–1957
Dalton-Whitfield County	5–21–1957
Griffin	11–14–1957
La Grange	12–20–1956
Moultrie	5–22–1957
Quitman	5– 8–1957
Savannah-Chatham County	9–25–1956
Statesboro-Bulloch County	3–27–1957
Valdosta	3–12–1958
Waycross	3–14–1958
Illinois	
Chicago	6–13–1957
East Side Health District	6– 5–1958
Brooklyn	
Cahokia	
East St. Louis	
Fairmont City	
National City	
Washington City	
Evanston	3–13–1957
North Shore municipalities	3–20–1957
Glencoe	
Highland Park	
Kenilworth	
Lake Bluff	
Lake Forest	
Northbrook	
Wilmette	
Winnetka	
Oak Park	3– 6–1957
Peoria	4–17–1958
Indiana	
Anderson	5–22–1957
Berne, Bluffton, Warren area	1–17–1957
Bloomington	1–10–1958
Bremen	1–29–1958
Calumet region	4–24–1957
East Chicago	
Gary	
Hammond	
Columbia City	6–26–1957
Cooperative Grade A area	2–13–1958
Holland	
Huntingburg	
Jasper	
Tell City	
Elkhart, Goshen, Nappanee area	12– 5–1957
Evansville	12–20–1956
Frankfort	6–10–1957
Indiana Falls City area	10–16–1957
Jeffersonville	
New Albany	
Salem	
Scottsburg	
Kokomo	2–19–1957
Lafayette and W. Lafayette	5– 5–1958
Lake County	3–25–1957
Logansport	3–27–1958
Marion County	4– 2–1958
Michigan City	4–23–1958
Muncie	11–30–1956
New Castle	4–24–1958
North Manchester	7– 3–1957
Peru	4–10–1957
Richmond	4–24–1957
Rochester	12–19–1956
South Bend	12–11–1957
Union City	7– 3–1957
Vincennes	10– 3–1957
Warsaw	11–16–1956
Winchester	5– 7–1957
Kentucky	
Barbourville	11–28–1956
Bardstown and Nelson County	5–21–1957
Bell County	4–19–1957
Benton and Marshall County	2– 6–1958
Bowling Green and Warren County	7–22–1957
Brandenburg	4–11–1957
Butler and Falmouth	4– 2–1958
Cadiz	10– 5–1956
Campbellsville	4– 5–1957
Covington	6–13–1957
Cynthiana and Harrison County	4– 8–1958
Danville and Boyle County	4–__–1958
Elizabethtown	1– 8–1958
Frankfort	10–18–1957
Georgetown	10–16–1956
Greenville	1–21–1958
Harrodsburg	2–20–1957
Hodgenville	2–14–1957
Hopkinsville and Christian County	9–26–1957
Lawrenceburg and Anderson County	6– 5–1958
Leitchfield and Grayson County	10–10–1957
Liberty	10–11–1956
Louisville and Jefferson County	3–__–1958
Mayfield and Graves County	8– 2–1957
Maysville	7–23–1957
Monticello	7–20–1956
Morganfield and Union County	1–21–1958
Morgantown	1–10–1958
Murray and Calloway County	2– 5–1958
Newport and Campbell County	10–18–1957
Owensboro	5– 9–1958
Owenton	3–31–1958
Paducah	7–31–1957
Paris and Bourbon County	1–__–1958
Pendleton County	4– 2–1958
Shelby County	1–17–1958
Smithland and Livingston County	2– 7–1958
Trigg County	10– 5–1956

Communities awarded milk sanitation ratings of 90 percent or more, July 1956–June 1958—Con.

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	Date of rating
Mississippi	
Amory	4- 8-1958
Booneville	8-28-1957
Brookhaven	1-15-1958
Canton	11-14-1956
Clarksdale	1- 9-1957
Columbus	9-19-1956
Corinth	7- 9-1957
Grenada	9-24-1957
Hernando	1- 7-1957
Houston	6-26-1957
Iuka	7-11-1957
Laurel	7-12-1956
Louisville	11-23-1956
Macon	2-26-1958
McComb	8- 2-1956
Meadville	3- 7-1957
Meridian	2-27-1958
Morton	7-24-1956
New Albany	10-10-1957
Oxford	8-27-1957
Pascagoula	6-19-1957
Picayune	10-30-1957
Starkville	3-13-1957
State College	3-13-1957
Tupelo	4- 9-1957
Missouri	
Cape Girardeau	7-12-1956
Chillicothe	3- 5-1957
Kansas City	8-17-1956
St. Joseph	6-14-1957
St. Louis	11-26-1957
Sedalia	8- 7-1957
Sikeston	2-11-1958
Springfield	10-26-1956
Nebraska	
Omaha	2-19-1958
Nevada	
Clark, Lincoln, and Nye Counties	5- 1-1957
New Mexico	
Albuquerque	10-26-1956
Portales	9-28-1956
North Carolina	
Alamance County	3-15-1957
Beaufort County	5-22-1957
Bertie County	2- 7-1958
Camden County	7- 5-1956
Chatham County	8-13-1957
Chowan County	7- 5-1956
Craven County	8-30-1957
Cumberland County	3-28-1958
Durham County	4-22-1958
Edgecombe County	5-21-1958
Forsyth County	2-22-1957
Guilford County	9-26-1956
Halifax County	9-13-1957
Haywood County	3-14-1958
Jackson County	12-12-1956
Lee County	3- 7-1957
Lenoir County	2- 4-1957
Macon County	12-12-1956
Mecklenburg County	3- 7-1958
Montgomery County	10-22-1956
Moore County	5-15-1958
Nash County	1-17-1957
Northampton County	9- 6-1956
Onslow County	5-20-1957
Orange County	8-13-1957
Pamlico County	5-24-1957
Pasquotank County	7- 5-1956
Perquimans County	7- 5-1956
Person County	8-13-1957
Pitt County	4- 1-1958
Rocky Mount	2-27-1958
Rowan County	6-28-1957
Sampson County	8-27-1956
Scotland County	11-22-1957
Stanly County	12-11-1956
Swain County	12-12-1956
Tyrrell County	2- 6-1958
Washington County	2- 6-1956
Wayne County	1-27-1958
Wilson County	1-27-1958
Ohio	
Lima	10-1957
Oklahoma	
Bartlesville	2-26-1957
Tulsa	6-21-1957
Tennessee	
Bristol	11- 7-1957
Chattanooga	11-20-1956
Clarksville	2- 7-1958
Cookeville	10- 2-1957
Copperhill	11-27-1956
Covington	10-23-1956
Cowan	11-20-1956
Decherd	11-20-1956
Dyersburg	11-14-1956
Elizabethton	5-28-1957
Greeneville	1-28-1958
Huntingdon	10-29-1956
Jefferson City	8-20-1956
Kingsport	1-30-1958
Knoxville-Knox County	9-25-1957
Manchester	10-12-1956
Memphis	3-24-1958
Morristown	8-20-1956
Murfreesboro	8-14-1957
Nashville-Davidson County	10-28-1957
Newbern	11-14-1956
Newport	1- 7-1958
Paris	11-17-1956
Rogersville	1-29-1958
Sweetwater	11-27-1956
Tullahoma	10- 9-1956
Winchester	11-20-1956
Texas	
Big Springs	12-14-1957
Brady	6-26-1957
Brownwood	6-21-1957
Bryan	10- 5-1957
Burkburnett	1-14-1958
Cleburne	1-17-1958
College Station	10- 5-1957
Corpus Christi	11- 1-1957
Dallas	10-19-1956
Denison	10-30-1957
Edinburg	3-14-1958
El Paso	2-13-1958
Falfurrias	2-15-1958
Gladewater	2-19-1957
Gonzales	6-21-1957
Harlingen	2-15-1958
Kerrville	4-11-1957
Kilgore	2-19-1957
Kingsville	11-14-1957
Lufkin	9-18-1957
McAllen	3-14-1958
Midland	12-14-1957
Mineral Wells	6-21-1957
New Braunfels	1-31-1957
Odessa	12-14-1957
Port Arthur	10-23-1957
San Angelo	8- 8-1957
San Antonio	4- 1-1957
San Benito	2-12-1958
Sherman	10-31-1957
Texarkana	12-10-1957
Tyler	3- 5-1957
Vernon	6-21-1957
Wichita Falls	1-25-1958

Communities awarded milk sanitation ratings of 90 percent or more, July 1956–June 1958—Con.

100 PERCENT OF MARKET MILK PASTEURIZED—Continued

Community	*Date of rating*
Utah	
Logan	5–22–1958
Ogden	10–30–1957
Salt Lake City	5– 6–1958
Utah County	11–29–1957
Virginia	
Abingdon	11– 7–1957
Alexandria	6–28–1957
Blacksburg	8–16–1956
Bristol	11– 7–1957
Christiansburg	8–16–1956
Franklin	6– 7–1957
Marion	11–29–1956
Portsmouth	3– 7–1957
Pulaski	8–17–1956
Radford	8–15–1956
Richmond	4–18–1958
Virginia—Continued	
Staunton	4– 4–1958
Suffolk	6– 6–1957
Waynesboro	12– 5–1957
Washington	
Spokane	10–24–1956
Whitman County	11– 8–1956
Wisconsin	
Appleton	1–10–1957
Ashland	10–10–1957
Beaver Dam	2– 6–1957
Beloit	1–23–1958
Burlington	10–24–1956
Delavan	10–24–1956
Eau Claire	2– 7–1957
Wisconsin—Continued	
Elkhorn	10–24–1956
Fontana	10–24–1956
Fort Atkinson	10–24–1956
Green Bay	10–11–1957
Kenosha	7– 5–1957
La Crosse	1–29–1957
Lake Geneva	10–24–1956
Madison	11–29–1957
Manitowoc	4–12–1957
Oshkosh	7–11–1956
Racine	7–12–1956
Ripon	2– 6–1957
Sheboygan	7–26–1957
Walworth	10–24–1956
Waupun	2– 6–1957
Williams Bay	10–24–1956

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	*Date of rating*
Georgia	
Cedartown, 96.9	8–31–1957
Fitzgerald, 97.9	4–11–1957
Marietta, 97.8	10–26–1956
Rome, 99.1	10–16–1957
Washington, 99.8	3– 1–1957
Winder, 99	3– 7–1957
Idaho	
Ada County, 96	1–11–1957
Kentucky	
Lexington and Fayette County, 99	9–13–1956
Madisonville, 99	1–25–1957
Princeton, 96.5	2–21–1957
Somerset, 95	1–10–1957
Missouri	
Joplin, 91.4	2– 5–1958
North Carolina	
Buncombe County, 98.7	4– 1–1958
Cleveland County, 89.9	9–10–1956
Gaston County, 97.9	7–19–1957
Wake County, 99.9	1–27–1958
Oklahoma	
McAlester, 84	7–18–1956
Oklahoma City, 98	11– 9–1956
Tennessee	
Harriman, 95	4– 2–1958
Kingston, 96.5	4– 2–1958
Texas	
Abilene, 90	10–10–1957
Amarillo, 99.7	8–13–1957
Austin, 99.4	1–28–1957
Brownsville, 98.3	2–12–1958
Texas—Continued	
Fort Worth, 99.98	6–14–1957
Longview, 99	2–20–1957
Marshall, 98	1– 4–1957
Palestine, 99.2	10– 2–1957
Paris, 99	12– 5–1957
Virginia	
Charlottesville, 99.6	9–27–1957
Washington	
Seattle-King County, 99.7	4– 9–1957
West Virginia	
Kanawha County, 99	11–20–1956
Monongalia County, 97.8	8– 9–1957

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90-percent or more compliance with the grade A raw milk requirements, of the milk ordinance suggested by the United States Public Health Service.

Notice particularly the percentage pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, either commercially or at home, before it is consumed.

publications

Trachoma Manual and Atlas. *PHS Publication No. 541; 1958; by Phillips Thygeson; 42 pages; illustrated; 55 cents.*

The stages of trachoma, its clinical and laboratory diagnosis, and the criteria for differentiating trachoma from other follicular disease and either acute or chronic bacterial conjunctivitis are explained comprehensively in this medical handbook. Also discussed are the treatment procedures recommended for trachoma control campaigns. A series of photographs, 51 in black and white and 12 in color, show the gross appearance of trachoma and similar diseases in their various developmental stages.

Designed primarily for use by physicians and nurses in the Indian health program of the Public Health Service, the manual has potential value in trachomatous areas of other nations.

Dermatophytes—New methods in classification. *PHS Publication (unnumbered); 1957; 15 pages.*

It is recommended that physiological tests be used in conjunction with morphological studies for the accurate identification and classification of dermatophyte species.

A series of tests based on the nutritional requirements of certain dermatophyte species for vitamins and amino acids is described. These tests are particularly useful for identifying nonsporulating species such as *Trichophyton verrucosum*, *T. schoenleinii*, and *T. concentricum*. They are also useful for identifying morphologically similar species such as *T. mentagrophytes* and *T. tonsurans* or morphologically atypical strains of any of the *Trichophyton* species.

Another physiological test described is based on the manner by which detached filaments of hair are attacked by dermatophyte species. This is particularly useful in the separation of *T. mentagrophytes* and *T. rubrum* which attack hairs in vitro in different ways.

Free copies may be obtained from the Communicable Disease Center, Public Health Service, Atlanta 23, Ga.

The Research Attack Against Cerebral Palsy. *PHS Publication No. 552; 1958; 20 pages; 20 cents.*

The nature of cerebral palsy and the collaborative field investigation on this disorder being conducted through the National Institute of Neurological Diseases and Blindness are described in simple terms.

The booklet reviews some of the research findings of the recent past which may play an important role in the development of better methods of diagnosis, prevention, and treatment of cerebral palsy. It also contains an outline of the institute's grant programs as well as a concise view of the organization and growth of the institute as a component in the research mission of the National Institutes of Health.

The Dental Service Corporation—A new approach to dental care. *PHS Publication No. 570; 1958; 70 pages.*

Major points to consider in the formation, establishment, and operation of a nonprofit dental service corporation are reviewed.

One section of the pamphlet reports the historical development of the Washington State Dental Service Corporation, describes the corporate structure, and reviews its administration of a dental service program for the International Longshoremen's and Warehousemen's Union–Union Pacific Maritime Association Welfare Fund.

Another section covers general questions that planners of a dental service corporation must answer. Included are legal problems, tax requirements, contract negotiations, administrative principles, premium determinations, and statistical system planning.

Summary of Health and Vital Statistics. *PHS Publication No. 600; 1958; 27 pages; 25 cents.*

Frequently requested recent and background statistical data pertaining to the United States are depicted in 24 tables and 12 charts with explanatory paragraphs. They cover the total population and the population by age as well as school enrollments, marriages and divorces, live births and fetal deaths, and illegitimate live births.

Infant and maternal mortality, total deaths and deaths by age, leading causes of death and leading causes of death by age groups, deaths from cancer and other malignant neoplasms, and deaths from accidents (including cause of injury) are tabulated by year, number, and rate.

The booklet also presents statistics on reported cases of and registered deaths caused by communicable diseases, cases of general illness from selected causes, and average remaining lifetime at specified ages for the entire population as well as by color and sex. A study of the beds available in civilian hospitals and skilled nursing homes is included.

This section carries announcements of new publications prepared by the Public Health Service and of selected publications prepared by other Federal agencies.

Unless otherwise indicated, publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Office of Information, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications other than its own.

ECHOES from Public Health Reports

TYPHUS FEVER

THE EXPERIMENTAL TRANSMISSION OF ENDEMIC TYPHUS FEVER OF THE UNITED STATES BY THE RAT FLEA XENOPSYLLA CHEOPIS

By R. E. Dyer, *Surgeon*, E. T. Ceder, *Assistant Surgeon*, R. D. Lillie, A. Rumreich, and L. F. Badger, *Passed Assistant Surgeons, United States Public Health Service*

The incidence of endemic typhus fever in the United States, especially in the cities and towns of the southeastern States, has been brought to general attention in the past few years largely by the work of Maxcy (1). Whether endemic typhus of the United States is of European origin or represents an importation of Mexican tabardillo, or whether it is indigenous to the United States, is a matter of conjecture. Endemic typhus shows certain differences from the European, or epidemic, typhus, especially differences of an epidemiological nature. Epidemic typhus has its greatest prevalence in winter; it is associated with crowding; it is most prevalent in the lower strata of society; multiple cases in households, jails, and hospitals are common; and it has been shown repeatedly to be associated with lousiness.

In dis-

cheopis) has been

...ted out in the laboratory.

The foregoing evidence points to the rat flea (*X. cheopis*) as a common vector of endemic typhus from rat to rat and from rat to man.

REFERENCES

(1) Maxcy, K. F.: Pub. Health Rep., **41**:2967 (Dec. 24), 1926.
(2) Rumreich, A., Dyer, R. E., and Badger, L. F.: Pub. Health Rep., **46**:470 (Feb. 27), 1931.

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In this paper and an earlier one (February 13, 1931, pp. 334–338), Dr. R. E. Dyer reported that the agent for endemic typhus is the common rat flea, *Xenopsylla cheopis*.

U. S. GOVERNMENT PRINTING OFFICE: 1958